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CLIMATIC PROVINCES OF THE WESTERN UNITED STATES*

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INTRODUCTION

It is recognized that state and national boundaries are generally unsatisfactory lines upon which to base geographic divisions. For the most part the great facts of climate are controlled by features other than those which are used to divide state from state, especially in a region where the state boundaries tend to be straight lines or rivers, neither of which have any significance as a climatic barrier. In the study of the climate of the western part of the United States the necessity constantly arises for a division of the region into smaller units on the basis of the climate, as the conditions are too varied and the area is too large to be considered as a single unit.

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Previous Classifications

Supan's Provinces. Many attempts have been made to make a satisfactory classification of the climates of the world or of parts of it.[1] Perhaps the most noteworthy of these attempts are the climatic provinces suggested by Supan, Köppen, Herbertson and Dryer. Under Supan's classification of climates[2] the earth is divided into thirty-five provinces, of which the western United States is included in the following: (1) Northwest American Coastal Province, which has a mild, equable, rainy climate; (2) Californian Province, which is relatively cool, especially in summer, with marked sub-tropical rainy seasons; (3) North American Mountain and Plateau Province, with great annual and daily ranges of temperature, and which is dry. These provinces are shown on a small scale map, and their limits are not accurately defined. From the map the boundaries may be determined approximately. The Northwest American Coastal Province and the Californian Province include all the area west of the Sierra Nevada-Cascade range of mountains and also a part of the coast of southern California. The region of Puget Sound and the Olympic Mountains is included in the Northwest American Coastal Province, all the area south of this region, with the exception of a small district in the extreme southern part of California, is included in the Californian Province. The region east of the mountains is the North American Mountain and Plateau Province.

Köppen's Climates. The classification of climates proposed by Köppen[3] has a botanical basis. It takes into account the climatic variations due to altitude as well as those due to geographical location, and is, therefore, difficult to apply in a general way, although it should be extremely accurate locally. Köppen's map shows the coast mountains from the Strait of Juan de Fuca to San Diego and the Great Valley of California in one general climatic group, which is that of the "mesotherms," plants which require a moderate heat and a moderate amount of moisture. The coast mountains and valleys form a sub-group, the "Heath Climate," which has 30 millimeters (1.2 in.) of rain in the dryest month; in most parts of the region the rainfall in the summer,

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1 See Ward, R. DeC.: Climate, Putnam, New York, 1908, Chapters I, II, and III.

2 Supan, A.: Grundzüge der physischen Erdkunde, 5th edit., Leipzig, 1911, pp. 230-234, and Plate XV (translation in Ward's "Climate").

3 Köppen, W.: Versuch einer Klassifikation der Klimate, *Geogr. Zeitschr.*, Vol. 6, 1900, pp. 593-611 and 657-679.

that is the dry months, is much less than 30 millimeters, so that the classification is weak in this respect, which is, however, a minor one. The Great Valley of California forms a sub-group, the "Olive Climate," with a temperature of 295°A. (72°F.) in the warmest month and 275°A. (36°F.) in the coldest month. It is hard to see any purely climatic reason for separating the southern part of the Great Valley from southern California and retaining in the same group the Olympic Mountains and the coast region of southern California.

The Cascade, Klamath, the northern Coast Range, and Sierra Nevada mountains, and the Puget Sound and Willammette valleys are included in the "mikrotherm" group, which requires a smaller total heat and a lower mean annual temperature than the mesotherm group. Except for a narrow strip along the Cascade crest, which has the "Birch Climate," the whole of this group in the western United States is included in the sub-group of the "Oak Climate," with a mean temperature of more than 283°A. (50°F.) for four months, and a difference between the mean temperatures of the warmest and the coldest month of 10°A. (18°F.). There is a small part of the area of the Birch Climate extending into the Arctic conditions.

The whole area east of the Sierra Nevada-Cascade range, except for isolated areas in river valleys and at higher elevations, is included in the "xerophyte" group, which is a region of little moisture and high temperatures, at least for a short season. Southeastern California and western Arizona form the "Sandstorm Climate," central Arizona lies in the "Mesquite Climate" sub-group, eastern Arizona and New Mexico are in the "High Savanna Climate," and Nevada and Utah have the type of climate known as the "Prairie Climate." Eastern Oregon and Washington lie largely in the "Maize Climate" of the mesotherm group, and the "Oak Climate" of the mikrotherm group.

This classification is ingenious and capable of being worked out in great detail, but as far as the western United States is concerned it does not seem to agree with the climatic facts; for example, there is no part of California west of the mountains in which nearly as much as 30 millimeters of rain falls in the driest month. On the other hand the major groups may be regarded as representing climatic regions which have more or less similar characteristics. This classification does not seem to be as useful as that of Supan or that of Herbertson.

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Herbertson's Major Natural Regions. Herbertson's "Major Natural Regions"[4] are an attempt to divide the surface of the earth into natural provinces and, while climate plays an important part in the choice of regions and of boundaries, climate is only one of the controls which are considered. In addition to the attempt to make a series of provinces, Herbertson has attempted to make a series of classes which shall bring like climatic provinces into groups, and in this he has been remarkably successful. In this classification the western United States is included in the "Warm Temperate" and the "Cool Temperate Lands," with the exception of the southern part of California and western Arizona, which is grouped with the "Hot Lands." The Cool Temperate Lands are described as having cool summers and cold or mild winters; in the western United States this region is divided into the Western Margin Type, which is the region west of the Cascades, and the Interior Highlands Type, which is the region extending eastward from the Cascades to the Rocky Mountain front or beyond. The Western Margin Type of climate is characterized by heavy rainfall, particularly in winter; the Interior Highland climates have a much lighter rainfall and greater extremes of temperature.

The Warm Temperate Lands are warmer both in summer and in winter than the Cool Temperate Lands. The Western Margin Type of climate in the United States in this belt is the area west of the Sierra Nevada and the mountains of southern California. It is a region of mild temperatures and winter rains. The plateau type of climate in this belt in the United States includes the states of Nevada, Utah, New Mexico, and the eastern part of Arizona; it consists of lofty mountains enclosing plateaus of extreme aridity: the only fertile portions are the river valleys and such areas as can be irrigated. Southeastern California and the greater part of Arizona are part of the Hot Lands; the region is located in the West Tropical Desert Type of this belt. It is characterized by extreme aridity and large ranges of temperature.

Dryer's Natural Provinces. A classification has recently been made by Dryer[5] which has many of the characteristics of Supan's provinces, although the grouping suggests the Major Natural Regions of Herbertson. In this classification the western United

[4] Herbertson, A. J.: The Major Natural Regions, *Geogr. Journ.*, Vol. 25, 1905, pp. 300-309. See also revised chart in Herbertson's The Senior Geography, Oxford, 1909 (The Oxford Geographies, Vol. 3).

[5] Dryer, C. R.: High School Geography, New York, etc., 1912, pp. 328-330 and 358.

States is included in four provinces, Oregon, California, American Interior, and Arizonan. These provinces are contained in zonal groups as follows: Oregon and Interior in a zone known as the Temperate and Intemperate, Californian and Arizonan in the Subtropical and Warm Temperate Zone. The Cold Temperate Zone lies wholly to the north of the Canadian border and the Intertropical Zone is wholly south of the Mexican boundary in this region.

The Temperate and Intemperate Provinces are characterized by climates suitable to summer forests and coniferous forests and grass-land. The Oregon type of climate has a small range of temperature; all seasons are temperate, and the rainfall is from twenty to one hundred inches annually with excess in winter. The Interior type has extreme ranges of temperature and a rainfall of less than twenty inches (500 mm.).

The Subtropical and Warm Temperate Provinces are hot with a temperate season or temperate with a hot season. The Arizonan type of climate is a desert; the rainfall is less than ten inches (250 mm.); the daily range of temperature is far in excess of the annual. The Californian type has a small range of temperature and a rainfall of twenty to sixty inches (500 to 1500 mm.) annually with dry summers. This type of climate supports dry tropical forest and poor grass-land. It is a region of equable temperatures, clear skies, absence of storms, and dry, stimulating air.

The limits of these provinces are somewhat as follows: the Oregon and Californian provinces extend from the Pacific Ocean eastward to beyond the Cascade, Sierra Nevada, and southern California mountains; the division between the two provinces is drawn at about latitude 41°; the American Interior Province includes the Rocky Mountains and the Columbia Plateau or Snake River Lava Plains; the line between this province and the Arizonan follows the northern boundary of Nevada and Utah and the eastern edge of the Great Basin and the Colorado River Plateau in western Colorado and New Mexico.

Except that the coast region of California cannot be said to be hot at any season and that the rainfall is considerably less than twenty inches in many parts of the state, the descriptions are in accord with the general facts of climate in the region. In the Interior and Arizonan provinces the rainfall is locally in excess of the amounts indicated because of the topography, but the amounts are correct for the general conditions. Perhaps there is more re-

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semblance between the Oregon and the Californian and between the Interior and the Arizonan provinces than there is within the zones in which the provinces are grouped, but from a world-wide point of view the grouping by zones seems to be justified. Dryer's classification has the logical arrangement of the Major Natural Regions and in the western United States the boundaries of the provinces seem to be better located than the boundaries of these divisions.

Henry's Rainfall Types. In the "Climatology of the United States"[6] Henry has recognized the following rainfall types for the western United States: Pacific, Sub-Pacific, and Arizonan. The Pacific type of rainfall occurs over all the territory west of the Sierra Nevada and Cascade ranges and in the coast region of southern California, and also obtains in a fringe of country to the eastward of the mountain summits. The distinguishing characteristic is a wet season extending from October to March and a practically rainless summer, except in northern California and parts of Oregon and Washington. About half the yearly precipitation comes in the months of December, January, and February, the remaining half being distributed through the seven months of September to November and March to June. (See Figures 3 and 4 for examples of this rainfall type.) The Sub-Pacific type of rainfall is that which obtains over eastern Washington, Idaho, Nevada, and Utah. There is not, as in the Pacific type, a steady diminution of winter precipitation with the approach of spring, but rather an increase which culminates in the late spring months. (This rainfall type is shown by Spokane in Figure 2.) The Arizona type prevails over Arizona, New Mexico, and a small portion of southern Utah and Nevada. This type differs from all others in the fact that about thirty-five per cent of the rain falls in July and August. May and June are generally the months of least rainfall. (The rainfall at Needles, in Figure 2, shows this type not very clearly developed.) The summer rains are believed to be due chiefly to local convection on the mountains, and the winter rains to general cyclonic movements.

While these divisions by rainfall types do not represent the climatic features of the regions, they form a basis for division which for many purposes is wholly satisfactory. Probably the

[6] Henry, A. J.: The Climatology of the United States, *U. S. Weather Bureau Bull. Q*, 1906, p. 50. See also *idem:* The Rainfall of the United States, *U. S. Weather Bureau Bull. D*, 1897, p. 11–12.

seasonal distribution of rainfall furnishes the surest means for grouping the climates of the western United States. Henry has not shown the boundaries of the different types, and no attempt is made here to determine where these boundaries are to be found beyond the general statements of the areas included in each type.

Bases of Classification

An examination of the climatic provinces which have been suggested for the United States shows that the bases for the classifications are limited to temperature and rainfall conditions, which are by far the most important climatic factors. It is also true that, if the climatic data of regions which form homogeneous climatic units are examined, the general rainfall or temperature conditions will be found to be more or less similar; and if these homogeneous regions are compared with other homogeneous regions differences will generally appear either in the temperature or rainfall conditions or in a combination of these factors.

Any satisfactory grouping of localities on a climatic basis must take into account the actual temperatures, ranges of temperature, rainfall amounts and the distribution of rainfall through the year. It is practicable for some purposes to establish temperature provinces or zones, and also to establish rainfall provinces or regions; but, for a statement of climatic divisions which will throw places with similar climates into the same group and places with dissimilar climates into different groups, temperature and rainfall conditions must both be included.

In the western United States the greatest climatic differences are not those which are to be found in going from a lower to a higher latitude; the most marked differences are those which exist between the conditions east of the Sierra-Cascade range and the conditions west of these mountains near the Pacific Ocean. In the eastern division the summers are hot and the winters are cold; in the western division the temperatures (at least the sensible temperatures) are mild throughout the year. On the eastern and the western sides of the mountains there are important and marked differences in the annual rainfall, the amount being much greater on the Pacific side than on the eastern side. West of the mountains a winter maximum of rainfall is to be found, but to the east the maximum is more apt to occur in the spring or even in the summer months.

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Climatic Provinces

Any attempt to separate the western United States into climatic provinces must take into account the importance of the Sierra-Cascade range as a climatic divide. West of this divide the differences in climatic conditions are so gradual in passing from one part of the area to another and the general conditions are so similar that it seems best to include the whole region in a single province, which may be subdivided for detailed consideration. This general province west of the mountains may be termed the "Pacific Province." It includes all the continental United States, except Alaska, west of the Cascade and Sierra Nevada mountains, and also that part of California south of the Tehachapi Mountains[7] and west of the crest of the mountains of southern California, designated by Fairbanks as the Peninsula Range.[8] The outlines of the province are shown by the map, Figure 1. This province forms a continuous strip from San Diego to the Strait of Juan de Fuca, between the mountains and the ocean. This province varies greatly in width and includes many different types of topography, but it represents a more or less definite group of conditions and may, therefore, properly be considered as a climatic unit. The more important climatic features of the province may be stated briefly as follows: generally mild temperatures; marked subtropical winter maximum of rainfall, summers dry or with light cyclonic rains, except in the mountains where summer thunder-showers may occur.

East of the mountain crest line is a region markedly drier than the Pacific Province in the same latitude. The differences between the northern and the southern part of this region are much smaller than those between mountains and lower lands in close proximity to it, so that it is scarcely desirable to separate it into two or more major provinces. No greater differences exist between the different latitudes of this area than are to be found between San Diego and Seattle, for example. Locally and in the northern part of the region the mean annual rainfall is greater than that of the southern part of the Pacific Province; but, as its characteristic feature is deficient precipitation, especially when compared with the same latitude west of the mountains, this province may fitly be named the "Rain Shadow Area." It includes all the region east of the Sierra-Cascade crest and west of the Rocky Mountains, the

[7] The Tehachapi Mountains limit the southern end of the Great Valley of California; this range is generally considered as the dividing line between northern and southern California.

[8] Fairbanks, H. W.: The Geography of California. San Francisco, 1912, p. 112.

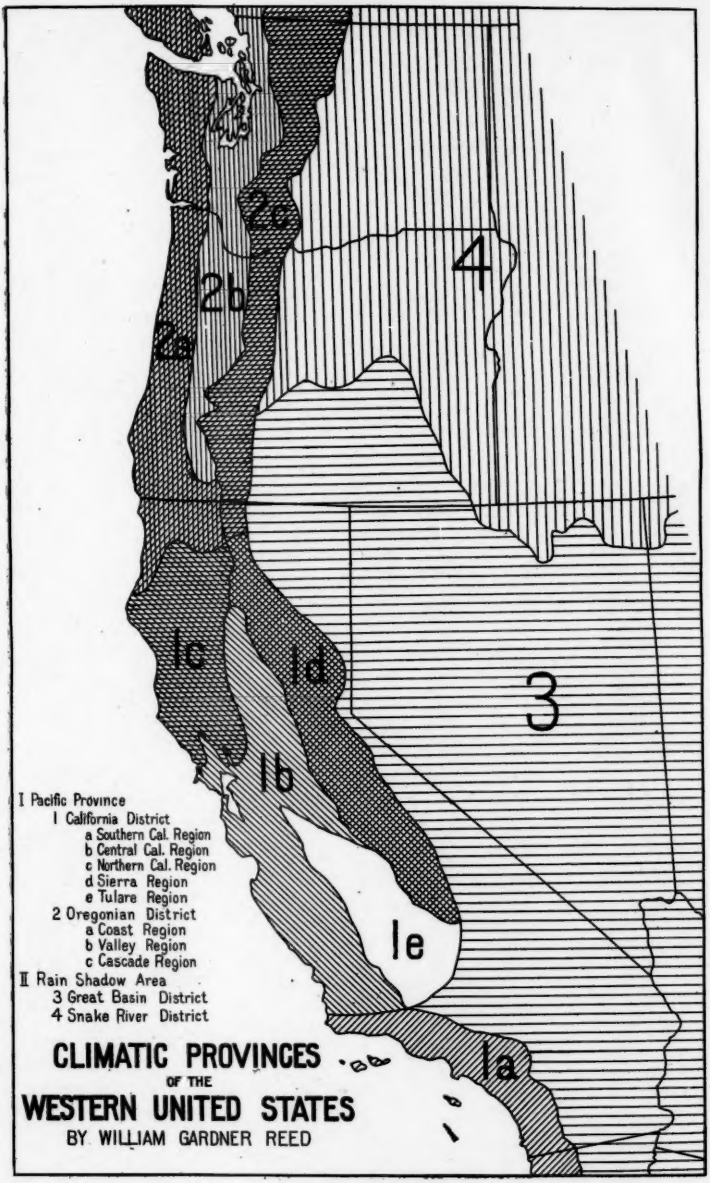

FIG. 1—Scale, 1:10,500,000.

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Colorado and Mojave Deserts in southern California, and also all of Arizona and the western part of New Mexico. No attempt has been made to determine accurately the eastern boundary of the province, as the data are few and the purpose of this study has been merely to establish a series of satisfactory climatic provinces for the Pacific Coast states. The map shows only the states bordering on the Pacific Ocean and Nevada, but it is certain that the Rain Shadow Area extends considerably farther east than the limits of the map, especially in the south. The climatic characteristics of the province are large diurnal and annual ranges of temperature, and generally deficient precipitation, arid in the south and semi-arid in the north.

Subdivisions

Rain Shadow Area. The Rain Shadow Area may be divided into two sub-provinces, which may be termed districts.[9] The basis for the subdivision must be mainly that of rainfall, although higher temperatures are found in the southern part of the province as a rule. There is also a difference in the seasonal distribution of rainfall; in most of the southern portion Henry's Arizona type of rainfall is the rule, although not as clearly developed as in the portion of the province not shown on the map (see curve of annual march of rainfall at Needles, California, Figure 2), while in the northern portion the rainfall is of the Sub-Pacific type (see the curve for Spokane, Washington, Figure 2). In general the southern part of the province has an annual average rainfall of less than ten inches (250 mm.) and the northern part more than ten inches; but there are so many local influences, such as altitude, which are exceedingly important as affecting the amount of rainfall, and the stations are so widely scattered that this does not form a satisfactory division.

The wide areas between stations make the definite establishment of the boundary very difficult. As there is a very definite drainage boundary which falls somewhere in the vicinity of the meteorological boundary between the northern and southern parts of the area, it has seemed best to follow this line, which is the divide between the streams flowing to the Pacific Ocean through the Columbia River and the streams which do not flow to the ocean. The area which is drained through the Colorado River lies well to the south and there is no danger of a complication from the fact

[9] There are some grounds for believing that a third district will be required if Arizona and New Mexico are included.

that the Colorado reaches the ocean. This boundary is in a sense climatic as the question of interior or exterior drainage depends mainly upon the relation between precipitation and evaporation. On this basis it is possible to divide the province into two satisfactory areas; these are the Snake River District in the north and the Great Basin District in the south. Whether Arizona and New Mexico belong to the Great Basin District or to a third district has not been determined, neither has the relation of Utah to the districts been completely ascertained. The climatic characteristics of the Great Basin District, besides the general characteristics of the Rain Shadow Area, are high maximum temperatures and annual rainfall generally less than ten inches (250 mm.), mostly of the Arizona type of seasonal distribution, especially in the

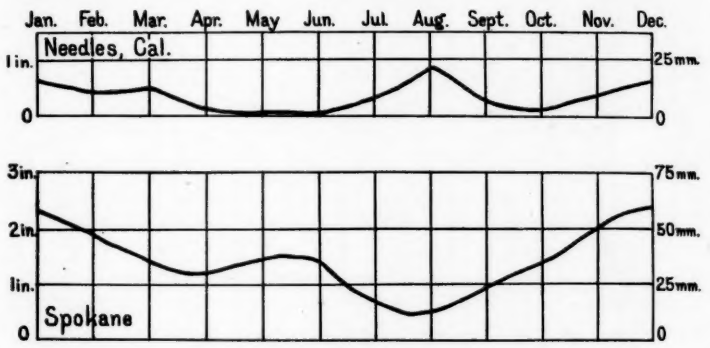

FIG. 2.

Annual march of rainfall in the Rain Shadow Area.

Needles, California, Great Basin District, Arizona type of seasonal distribution, poorly developed.

Spokane, Washington, Snake River District, Sub-Pacific type of seasonal distribution.

southern portion. The Snake River District has an annual rainfall of ten to twenty inches (250 to 500 mm.), somewhat greater in the mountains, with the Sub-Pacific type of seasonal distribution. It does not seem practicable to carry subdivision of the Rain Shadow Area further than the two districts, as the controls of local climate in the region are topographic rather than areal, and, therefore, similar conditions occur in more or less separated places.

Pacific Province. The Pacific Province is composed of a considerable number of areas which differ climatically from each other in one or more respects. It is, therefore, desirable to subdivide this province to suit these areas. If the northern and the southern

parts of the province are compared certain differences appear; these are principally somewhat lower temperatures, the common occurrence of snow at low altitudes in winter and of light cyclonic rains in summer in the northern part and not in the southern part of the province. Of these phenomena temperature must be discarded at once, as any division of the province on a temperature basis must be arbitrary and illogical, because of the slight differences between the different parts of the province and the occurrence

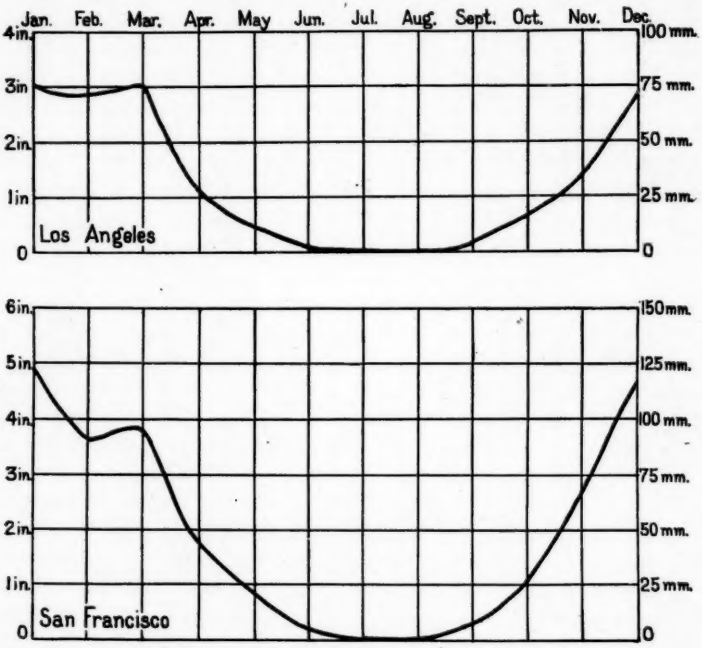

FIG. 3.

Annual march of rainfall in the Californian District of the Pacific Province.
Los Angeles, California, Southern California Region.
San Francisco, California, Central California Region, Pacific type of seasonal distribution.

of temperatures in the mountains of the southern portion which are like those at lower altitudes farther north. There remains the occurrence of snow and of summer rains under cyclonic control. Fortunately the usual limits of these two phenomena are approximately the same, and this line furnishes an entirely logical division of the province into two districts, the California District in the south and the Oregonian District in the north. In the Californian

District summer thunder-showers may occur in the Sierra Nevada mountains, but these may be regarded as local storms and are not the same as the cyclonic summer rains of the Oregonian District.

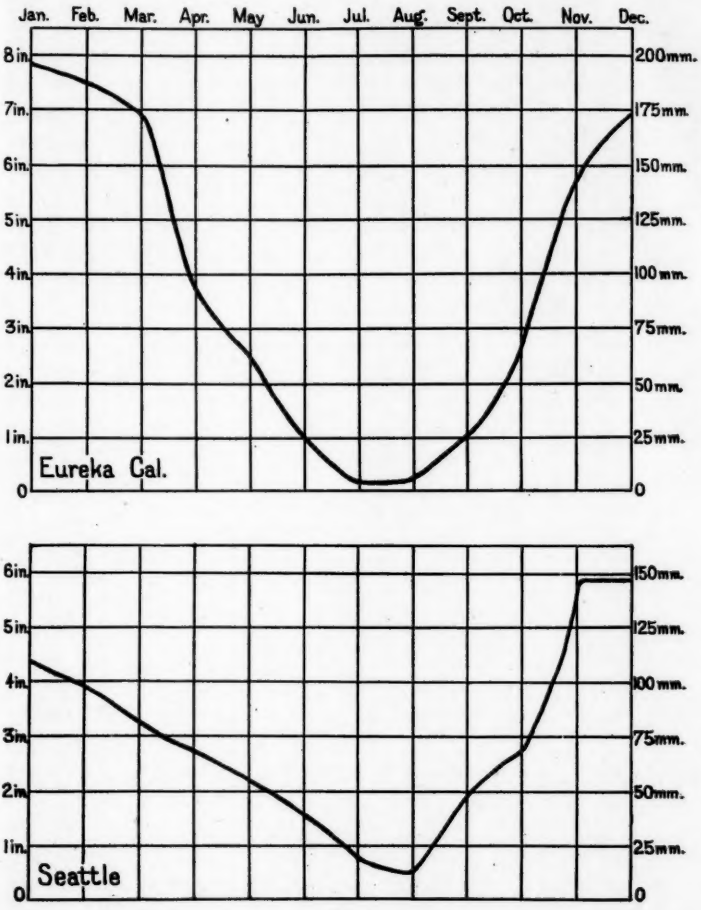

FIG. 4.

Annual march of rainfall in the Oregonian District of the Pacific Province.
Eureka, California, Coast Region,
Seattle, Washington, Valley Region, Pacific type of seasonal distribution.

The dividing line, as shown on the map, has been drawn between stations having significant rainfall in the summer months

and those in which July and August are characteristically dry. (See the curves of annual march of rainfall in the Pacific Province, Figures 3 and 4.) This involves an examination of the records of the stations by months, as the averages in many cases have been influenced by the occurrence of single heavy falls of rain so that they show significant amounts although the monthly record shows that for most of the years July and August have been quite dry. The division line lies south of the Lava Plateau and the Klamath Mountains; it reaches the coast at a point somewhat south of Eureka. The Californian District is characterized by generally mild temperatures, winter rains under cyclonic control and dry summers except for local thunder-showers in the higher mountains. The Oregonian District is characterized by generally mild temperatures, winter maximum of rainfall under cyclonic control and light cyclonic rains in summer.

Divisions of the Californian District. Unlike the Rain Shadow Area the districts of the Pacific Province may be further divided into satisfactory climatic areas. The climates of these areas are controlled by the "meteorological latitude," the topography, and the relations to the Pacific Ocean. The Californian District may logically be subdivided into the following climatic regions: the Southern California Region, the Central California Region, the Northern California Region, the Sierra Region, and the Tulare Region.

The Southern California Region includes the portion of California west of the crest of the Peninsula Mountains and south of the Tehachapi Mountains and their western extension, the Santa Ynez Mountains. The region lies on the southern and western slopes of the mountains and the coastal plain along the Pacific Ocean. The characteristics which distinguish it from the other regions of the Californian District are the dry summer of three or four months' duration and an annual rainfall of generally less than twenty inches (500 mm.). (The rainfall curve for Los Angeles, Figure 3, is typical for this region.) Locally in the mountains this amount may be exceeded, but the region is one of light to deficient rainfall and the rain which falls occurs under a winter régime. Snow is very rare and frost is by no means an annual phenomenon.

The Central California Region includes the Coast Ranges and the valleys west of the Great Valley south of San Francisco Bay, the Santa Rosa and Napa valleys which enter San Francisco Bay from the north, and the Great Valley of California north of the

annual isohyet of ten inches (250 mm.), which crosses the valley from southeast to northwest near Merced. This region has a dry summer of about two months' duration and an annual rainfall of from ten to thirty inches (250 to 750 mm.), which is greatly exceeded locally in the Santa Cruz Mountains and elsewhere. (A typical curve of the annual march of rainfall in this region is that for San Francisco, Figure 3.) Snow occurs occasionally and frost is usually recorded once or oftener each year. The region is the largest of the Californian District, and it may be said to have the typical or average California climate, if there is any such.

The Northern California Region includes the Coast Ranges north of San Francisco Bay to the northern boundary of the Californian District, except the Santa Rosa and Napa valleys. It has an annual rainfall of more than thirty inches (750 mm.). In other respects it is similar to the Central California Region, except that the temperatures are somewhat lower and frosts and snow more common. There is also a greater tendency to summer rain, although summer rains are not the normal occurrence in the region.

The Sierra Region includes the Sierra Nevada mountains from the foothills of the Great Valley eastward, except that where the annual isohyet of ten inches (250 mm.) passes from the foothills to the mountain slope the boundary follows the isohyet. This region is separated from the Northern California Region by the Sacramento River, as there is no definite logical boundary although the climates of the two regions are somewhat different. The Sierra Region is characterized by an annual rainfall greater than that of the Great Valley in the same latitude, most of which falls in the form of snow. In many parts of the region summer thundershowers are not uncommon. The temperatures are somewhat lower than in the other regions of the Californian District and the climate is of the mountain type.

The Tulare Region includes the southern end of the Great Valley of California, that is the upper San Joaquin Valley and the Tulare Basin, and also the dry mountains to the south and southeast of the Tulare Basin. It has an annual rainfall of less than ten inches (250 mm.) and the ranges of temperature are larger than elsewhere in the Californian District. The climatic conditions in this region are in many respects like those of the desert region on the south and southeast side of the mountains, the crest line of which forms the boundary between the Pacific Province and the Rain Shadow Area, except that the summer rains, sometimes of a torrential type, "cloudbursts," are not common enough

to make the curves of average rainfall resemble those of the desert. From a large part of the Tulare Region, the Tulare Basin, the drainage does not reach the ocean.

Divisions of the Oregonian District. The Oregonian District does not fall as readily into climatic regions as the Californian District. There are, however, three belts parallel to the coast which are characterized by climatic differences, the chief of which is probably the average annual amount of precipitation. The difficulty in fixing accurately the climatic boundaries in the district has led to the adoption of topographic boundaries. There are climatic boundaries, however, which probably are more or less coincident with the topographic boundaries selected, as the climatic differences are largely under topographic control. There can be little doubt that the most satisfactory climatic regions in the Oregonian District are the Coast Region, the Valley Region, and the Cascade Region. From the data available there seems to be no reason for any subdivision of the district along latitude lines, except that the area south of the Valley Region, the Klamath Mountains, has been included in the Coast Region; otherwise the conditions from north to south in each region are relatively constant.

The Coast Region includes the Klamath Mountains, the Coast Ranges in Oregon and Washington, and the Olympic Peninsula. The boundary of the region as shown on the map has been drawn from the Cascade Range south of the Rogue River Valley, which seems to have about the same climate as the Willamette Valley, although topographically more or less distinct; along the western portion of the line of valleys the boundary has been drawn as nearly as may be at the crest of the eastern of the ridges of the Coast Mountains, which is the western limit of the valleys. The map shows Vancouver Island as a part of the Coast Region; perhaps the Pacific Province should not be extended north of the Straight of Juan de Fuca. It is certain that there is an Alaskan Province, but no attempt has been made at this time to determine its southern limit beyond the fact that it is not farther south than the International Boundary. The characteristic feature which distinguishes the Coast Region from the other regions of the Oregonian District is its heavy to excessive annual rainfall, generally more than sixty inches. (The curve for Eureka, Figure 4, is typical for the southern part of the region.) Especially at the higher altitudes there is a good deal of snow. Temperatures are mild and temperature ranges small.

The Valley Region is essentially the floor of the Puget Sound

and Willamette valleys and the smaller valleys to the south. Its western and southern boundary is that of the Coast Region; its eastern boundary may be taken as the isohyet of forty inches in the Cascade foothills and the southward extension of this line. The chief climatic characteristic of the region, aside from those of the province and the district, is the smaller annual rainfall than the Coast Region or the Cascade Region. (The curve of the annual march of rainfall at Seattle, Figure 4, shows typical rainfall conditions for the Valley Region.) The temperature régime is moderate, particularly in the Puget Sound area.

The Cascade Region is the eastern part of the Oregonian District; it consists of the Cascade Mountains from the annual isohyet of forty inches (1000 mm.) along the foothills to the crest-line of the mountains, which forms the eastern boundary of the Pacific Province. In the south the boundary between this region and the Coast Region cannot be determined with accuracy; it has been drawn on the map as a line connecting the eastern border of the Valley Region with the boundary between the Northern California Region and the Sierra Region of the Californian District, which is the Sacramento River. The Cascade Region is characterized by an average annual rainfall greater than that of the Valley Region, more than forty inches (1000 mm.), with the exception of the southern part of the region; much of the precipitation is in the form of snow; a large part of the rainfall is in the winter. Temperatures are somewhat lower than in the two regions to the west and ranges are greater, although not as large as the ranges in the Snake River District to the east of the mountains.

Summary and Conclusion

None of the published climatic provinces of the western United States are satisfactory. A new grouping of this part of the country into two provinces is suggested. The provinces are as follows: a Pacific Province which includes all the region west from the crest of the Cascade, Sierra Nevada, and Peninsula mountains to the Pacific Ocean, and a Rain Shadow Area which includes the region east from this crest-line to the eastern boundary of the region under discussion. This eastern boundary has been left undetermined, but it is somewhere in the vicinity of the Rocky Mountains. The Pacific Province is characterized by marked subtropical winter rains and dry or nearly dry summers; the Rain Shadow Area has large diurnal and annual ranges of temperature and generally deficient precipitation.

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The Rain Shadow Area may be divided into two districts: the Great Basin District is all the territory covered by the province south of the water-parting between the Columbia River drainage and the interior drainage; the Snake River District is all the province north of this line. The Great Basin District has high maximum temperatures and an annual rainfall of generally less than ten inches (250 mm.); the Snake River District has an annual rainfall of ten to twenty inches (250 to 500 mm.) with the Sub-Pacific type of seasonal distribution.

The Pacific Province may be divided by the line which separates the portion of the province having generally dry summers from that part in which light cyclonic rains are not uncommon in summer. The district south of this line, which is in northern California south of the Klamath Mountains, is the Californian District; the district north of the line, western Washington, western Oregon, and northern California, is the Oregonian District.

Each of these districts of the Pacific Province may be subdivided into climatic regions. The climatic regions of the Californian District are five in number: the Southern California Region, which includes all the Pacific Province south of the Tehachapi and Santa Ynez mountains; the Central California Region, which includes the Coast Ranges south of San Francisco Bay and also the Sacramento Valley; the Northern California Region, which includes the Coast Ranges north of San Francisco Bay; the Sierra Region, which includes the Sierra Nevada mountains, except the extreme southern part of the range; and the Tulare Region, which includes the southern end of the Great Valley of California and the north and northwest slopes of the Tehachapi Mountains. The Southern California Region has a dry summer of three or four months' duration with an annual rainfall of generally less than twenty inches (500 mm.). The Central California Region has a dry summer of about two months' duration with an annual rainfall of ten to thirty inches (250 to 750 mm.). The Northern California Region has an annual rainfall of more than thirty inches (750 mm.). The Sierra Region has an annual rainfall greater than that of the Great Valley in the same latitude; most of the precipitation occurs as snow. The Tulare Region has an annual rainfall of less than ten inches (250 mm.) and larger temperature ranges than elsewhere in the Pacific Province.

The Oregonian District may be subdivided into three climatic regions: the Coast Region includes the Klamath Mountains and all the area west of the western boundary of the Puget Sound-Willa-

mette valley; the Valley Region includes these two valleys and the minor valleys in southern Oregon; and the Cascade Region is the Cascade Mountains from the foothills east of the valleys to the crest of the range, which is the eastern boundary of the Pacific Province. The Coast Region has a heavy to excessive annual rainfall. The Valley Region has a smaller annual rainfall than either the Coast Region or the Cascade Region. The Cascade Region has an annual rainfall which is between that of the Valley Region and that of the Coast Region in amount; this region has more snow than the Coast Region.

The foregoing climatic provinces have been made in an attempt to divide the western United States in such a way that areas with similar climatic conditions shall fall within the same general group and that areas with essentially different climatic conditions shall be kept separate. The boundaries are probably subject to considerable readjustment and perhaps other divisions would be recognized. From the use which has already been made of these divisions they seem to be more logical and of greater practical value for the description and study of this portion of the country than any of the previous groupings.

HOW AMERICAN CITIES GROW

By MARK JEFFERSON
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Astonishing are the differences in the growth of American cities, and astonishing, too, is the distinctness with which that growth responds to the nature and extent of each city's sustenance space, its tributary district. New York, the colossal, stands without peer, towering above all other cities in size, just as it stands apart in the service it is able to render to a continent. Only the economic and commercial capital of English America could stand so alone. Only the unique Mohawk gap in the Appalachian upland, that parts the Mississippi from the Atlantic coast, has made possible New York's pre-eminence as the market of a hundred million people. Fig. 1 shows this fitly.

At no time in the last seventy years has any other American city had half the population that New York has had at the same time. The six cities shown in Fig. 1 are the greatest in North America. Any others—there were fifty that passed the hundred thousand mark in 1910—would have the lines that show their

growth all contained in the lower right-hand corner of this diagram, below the curve for Cleveland. In each of the diagrams the vertical divisions mark the decades of somewhat more than a half century.

New York, Chicago and Philadelphia are the giants among our cities; Boston, St. Louis, Cleveland, Baltimore, Pittsburg, and Minneapolis-St. Paul, our great cities, with more than half a million each. New York's growth has been that of the American nation. It has gained with every American conquest of nature or of men. The Louisiana Purchase augmented the territory tributary to it, the Mexican war and the addition of Texas and California enlarged it again. Every forest, every mine in the country has had significance for New York, but, more than all else, the progressive occupation of American soil and the bringing of it under cultivation have fostered this city's growth. For our country has been growing up through a period of unparalleled development of means of communication; and all these lines of communication—rail, river, lake, or canal—bring to New York the products of a continent.

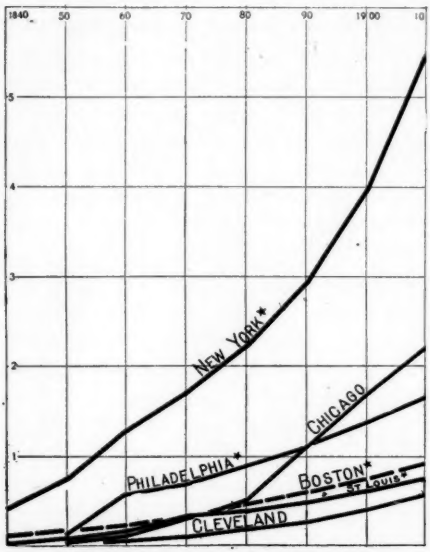

FIG. 1—The six giant cities of English America, showing the millions of people in each in every decade from 1840 to 1910. The vertical divisions on this diagram mark the decades; the horizontal lines millions of people. On the diagrams that follow, the horizontal lines stand for *hundreds of thousands*, thus greatly magnifying the values for the lesser cities. It is only on this diagram, therefore, that we get any conception of the overwhelming magnitude of New York, which has added to its population in every decade, for the last four, people enough for a larger city than Cleveland, and, in the last decade, people enough for a city nearly as large as Philadelphia. All of these, except Chicago, are of *vigorous growth*, i.e., they add more people in each decade than in the previous one. Cleveland is the finest type of this, as seen better on Fig. 2. The stars indicate that the cities represented are *geographic*, including the whole citified settlement at the spot. St. Louis* includes East St. Louis, Ill., Philadelphia* includes Camden, N. J., Boston* includes Cambridge, Somerville, Chelsea and Brookline, and New York* Jersey City, Hoboken and Newark, N. J.

How effectively the Appalachians bar other eastern cities from easy intercourse with the continental hinterland we see by the curves of growth of Boston, of Philadelphia, and, most of all, of

Baltimore. Cities on our inland waters flourished amazingly with the early development of river and lake navigation, only to suffer an inevitable check as the hand of railroad control choked out the life of water-carriage, as happened to Cincinnati forty years ago and to Chicago during the last two decades in much less degree. The diagrams show all these things. But while railroad-carriage has always gotten the better of water-carriage, and while the railroad centers have thriven with a vigorous growth that river and lake towns have been unable to maintain, all ways of transportation have led to New York, and New York has prospered without pause. Once only has the growth of the city faltered—in the decade of the civil war. New York added fewer people to her population in that decade than in the one before—543,000 from 1850 to 1860, but 410,000 from 1860 to 1870. It is in keeping with the national character of the city's growth that only a national catastrophe has been able to set it back. Chicago and St. Louis, on the other hand, had a boom in the war decade. St. Louis has never since equalled the growth of those ten years. Boston and Cleveland grew steadily and unaffected through the war. Philadelphia suffered a much greater check than New York and, from 1870 onward, has had a much more modest type of growth than its vigorous neighbor, corresponding to a limited sustenance space.

Examination of the growth curves of all large American cities shows that their economic history is accurately portrayed in these lines. New York's curve suggests a criterion of vigor in city growth. If a city added the same number of people, decade after decade, its line would be a straight one, ascending steeply if the amount was large, gently if it were small. To get a curve concave upward, like New York's, it is necessary *to add more in each decade than in the one before.* That is a simple criterion of vigorous growth. The most perfect examples are the smaller cities—Cleveland, Columbus, Dayton, Indianapolis, and Bridgeport, Conn.—none of which shows any such setback as New York's check during the civil war.

The New York of these figures is the *geographic* city, all the continuous settlement about the port at the Hudson mouth, including the Jersey shore. Eleven cities, all marked in this paper by asterisks, receive similar corrections to the incomplete data of the usual political city. Thus Philadelphia* includes the Jersey shore overflow at Camden; Cincinnati* the overflow into the Kentucky settlements of Newport and Covington across the Ohio. The twin cities, St. Paul and Minneapolis, are taken as one, and also Duluth

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and Superior. These combinations will be again referred to in speaking of Oakland.* Thus conceived, New York* has had the following population numbers since 1840, given in *thousands,* that is, omitting three ciphers:

1840	'50	'60	'70	'80	'90	1900	'10
411	743	1286	1696	2200	2896	3949	5452

The decennial increments have been:

332	543	410	504	696	1053	1503

Now, except for the decade of the civil war, these increments are larger for each decade, and that is true as far back as 1810. The increment of the decade *before* the war was not reached again for twenty years. For Cleveland the equivalent increases have been:

1840	'50	'60	'70	'80	'90	1900	'10
11	26	50	67	101	121	179	

smaller, since Cleveland is not the giant among cities that New York is, but always increasing, even through the war. This makes Cleveland a perfect example of vigorous growth.

An extreme form of this vigor is noted in the cities of the New Pacific: Los Angeles, Oakland,* Portland, Seattle, Vancouver, and Spokane, which have nearly doubled their population two decades running! *Exuberance* is the only name appropriate to a vigor so great. On the other hand, failure to add to a city's population in one decade as many as in the previous one gives an upward convexity to the line, such as we see on the New York diagram for 1850 to 1870, which we attributed to the war. The habit of doing this is a habit of *faltering* or *halting* growth. It is still growth, and may be good growth, but it must indicate less of intrinsic vigor than the city has earlier possessed. Some of our greatest cities show this halting growth. Such are Chicago and other lake cities for the last two decades, under the gentle but effective throttling of lake transportation by the railroads, and such, in even greater degree, has been the fate of the river cities ever since the civil war. The halting growth of Chicago is plain on Fig. 1.

On Fig. 2 are examples of all the different types—the vigorous Cleveland and Columbus, the exuberant Los Angeles, the halting Cincinnati, on the Ohio, and its singular companions, Albany, the political, the feeblest growth among American cities, and Washington, since 1874 a disfranchised city. All but these last two are types of groups of cities that are now to be described, but the reality of the contrasts in growth is best seen on bringing the types together on the same scale in one diagram.

Apart from Albany, the only large city that has actually lost population is Memphis, with 40,226 in 1870 and 33,592 in 1880. A severe epidemic of yellow fever in the seventies killed thousands of the people, bankrupted the city, and destroyed its government so completely that state and nation had to step in to restore order. Two other cases of loss are kept on the records of the United States census, though both are well known to be false returns based on a misguided spirit of local patriotism. They are Omaha, Neb., and St. Joseph, Mo. Omaha was reported to have 140,452 in 1890 and 102,555 in 1900. The true figure for 1890 was probably 60,000 or 70,000. St. Joseph was returned at 102,979 in 1900 instead of

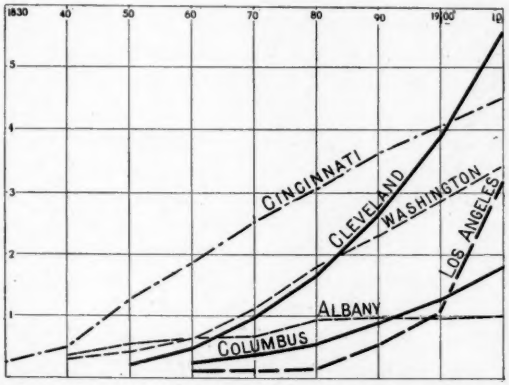

FIG. 2.—Shows the three types of growth of American cities from 1840 to 1910. The vertical partings mark the decades, the horizontal lines the hundreds of thousands of people. Los Angeles typifies the *exuberant* growth of the New Pacific cities, almost doubling their population two decades running. Cleveland and Columbus illustrate the *vigorous* growth of cities of the humid east, adding more people to their population in each decade than in the previous one, and thus giving a curve concave upward. Cincinnati is a typical river city of *halting* growth, frequently adding fewer people in one decade than in the previous one, and making its curve convex there. Albany's curve shows that it does not suffice for city growth to be the capital of a great state. Even Washington, since its disfranchisement in 1874, has grown but poorly.

some 65,000. The exact figure cannot be known in either case, but there was no loss. There certainly was growth, and an estimate is better than the known overcounts, although these are still printed in the "Abstract of the Thirteenth Census" at p. 70.

Vigorous Cities. A healthful city must increase in size. New births provide for that, and in a new country like ours it should constantly draw on the new births of the country districts, whose life it shares and crowns. Progressive occupation of the land, which must go on for years yet in most of our country, will give

more sorting, distributing, and manufacturing for the city to do and call for immigration from older districts. And the larger the city the larger the growth. There cannot fail to be more births in a city of 100,000 than in one of 90,000, and the larger city must afford greater opportunity for employment and entertainment of newcomers than the smaller one. More people will come to it. This gives the upward curve of vigorous growth. But for occasional lapses, such are the curves of thirty of the fifty-odd American and Canadian cities. I have named six of them already, the most perfect types. The others are: Birmingham, Ala.; Atlanta, Ga.; Minneapolis-St. Paul, New York,* Philadelphia,* Boston,* Detroit, Montreal, Toronto, Kansas City,* Rochester, Denver, Omaha,* Worcester, Syracuse, New Haven, Scranton, Richmond, Va.; Paterson, N. J.; Fall River, Mass.; Grand Rapids, Mich.; Nashville, Tenn., and Providence, R. I.

In the main they are the cities of the humid east. Here abundant rainfall has enabled prosperous communities to grow in response to the need of cities as manufacturing and distributing centers. They have grown variously. Some are small, like Grand Rapids, hemmed in between Detroit and Chicago; Dayton, between Columbus and Cincinnati;* Worcester, New Haven, and Bridgeport, between Boston* and New York,* and Richmond and Nashville, cities of the undeveloped south. Some have passed 500,000, like Montreal and St. Louis,* neither of which has a city of 100,000 population within 200 miles; Boston* with nearly 1,000,000 people, and four cities of 100,000 within fifty miles; and Detroit and Cleveland on the lakes near the population center of the land. Two are the giants, New York* and Philadelphia,* in the midst of that inner lowland of the Atlantic coast where dwell the greatest mass of our people at the gates of the continent. All these cities of the humid east have the habit of adding more in each decade than in the last one.

The habit has had its interruptions. Attention has been called to the effect of the civil war on New York* and Philadelphia.* The decade of the nineties saw a check in the city growth of yet wider effect. The panic of 1893 was perhaps the cause. The effect was strong in Canada and the west. Toronto, for instance, shows the following numbers in *thousands:*

1860	'70	'80	'90	1900	'10
45	59	96	181	208	376

and decennial increments:

14 37 85 27 168,

always increasing the gain until 1890-1900. Similarly, Montreal; so the New South of Birmingham and Atlanta and Richmond; so the New Pacific cities; so Denver and Kansas City,* and Omaha* and St. Paul-Minneapolis; so Rochester and Syracuse. But Boston,* New York* and Philadelphia* show no sign of it. The whole population of the United States, however, shows something quite similar in its growth. This has been in millions:

1790-1800	1800-10	'10-20	'20-30	'30-40	'40-50
1.4	1.9	2.4	3.2	4.2	6.1
'50-60	'60-70	'70-80	'80-90	'90-1900	1900-10
8.2	8.4	10.3	12.8	13	16

These figures show a vigorous growth, steadily increasing with each decade, but in the sixties and nineties the increase was very small. While it is extraordinary, it appears to be true that the panic of 1893 set back the growth of the United States exactly as much as the civil war did. In immigration figures we see the same check. There were nearly 3,000,000 immigrants in the seventies, over 5,000,000 in the eighties, but immigration fell to 3,700,000 in the nineties, to pass 8,000,000 in the last decade. It is not strange that sixteen cities grew more slowly in the nineties than before. It is not so clear why the effect was felt so differently in different parts of the country. Taken as a whole, the humid north held its own through the decade, and the humid south grew faster than usual. So this check, or one at the civil war alone, has not been counted against the regularity of a city's growth. In general, a single exceptional decade has been overlooked in any city's record. St. Louis had one in the seventies, so did Cincinnati and Louisville, possibly because of an influx of refugees from the south during the war decade that was not maintained later, or perhaps the mere activities of western bases of supplies during the war gave them a war-time activity that they lost later. It was quite as much increase in the war decade as falling off afterward that was noted. The explanation is for the local historian. It was a single decade and is overlooked. A similar setback befell Worcester and Fall River, Mass.; Paterson, N. J., and Grand Rapids, Mich., in 1900. Boston* has had two separate checks of small amount, adding 140,000 in the seventies, 129,000 in the eighties, 169,000 in the nineties, and 145,000 in the decade last past. Four other cities—New Haven, Lowell, Mass., Providence, R. I., and Syracuse—have had greater irregularities, but small ones. None of these diminish their increments two decades running, however, and all are accounted vig-

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orous. Their curves reveal no systematic unfavorable influence. All have a general upward convexity.

Exuberant Cities—Pacific. While this great group of cities of the humid east has been making a steadily augmenting growth the Pacific cities have made for decades a growth that is simply astonishing. For, adding from 50 to 100 per cent. in the nineties, in the last decade they have almost trebled in size. I include with them Winnipeg in Manitoba, so similar has been its growth. The thousands of people have been:

	1890	1900	1910
Los Angeles	50	102	319
Seattle	43	81	237
Oakland*[1]	65	97	214
Portland, Ore.	46	90	207
Winnipeg	25	41	135
Spokane	20	37	104
Vancouver	14	26	100

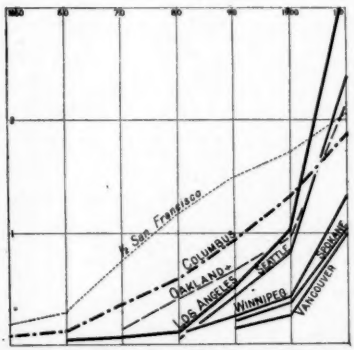

FIG. 3—Exuberant cities of the Pacific Coast. Shows the hundreds of thousands of people in each since 1860. Columbus has been included to show the contrast of exuberant and vigorous growth. Portland, Ore., has been omitted, as its figures are so like those of Seattle, to avoid crowding the lines and rendering them obscure. Winnipeg is included as belonging to the type, though not on the Pacific. San Francisco's data are also put on the map, *half size*, to bring the curve near the others for the smaller cities. It is seen that San Francisco has not the exuberant growth of its neighbors.

This is, I believe, unparalleled growth. One looks for such expansion only in cities newly come to their first 100,000, yet Los Angeles has carried it easily to 300,000. The nearest parallel that I know is Sydney, New South Wales, with 100,000 in 1881, 488,000 in 1891, and 621,000 in 1911. But there the second decade utterly failed to maintain the promise of the first one. Los Angeles, adding 52,000 in the first decade and 217,000 in the second, grew by 103 and 212 per cent. respectively. This surpasses all the others. Seattle added 88 per cent. and 194 per cent. in the two decades, Oakland* 49 and 121, Portland 95 and 129, Winnipeg 64 and 230, Spokane 85 and 183, and Vancouver 86 and 285.

Is it not singular that all these cities grow so similarly? Seattle

[1] Oakland* includes Berkeley and Alameda, the whole settlement on the east shore of San Francisco Bay.

and Los Angeles are 1,000 miles apart and their environments have very strong contrasts, yet each, and all their neighbors, show strong growth in 1890-1900 and an immense spurt in 1900-1910.

I have referred above to the crisis of 1893 as retarding the growth of certain eastern cities. Had it perhaps some influence on these Pacific communities? The effect of 1893 was curiously local. Taking account of the growth of the *total population*, instead of that of cities only, the humid north grew 20 per cent. in the eighties, 20 per cent. in the nineties, and 19 per cent. in the first decade of the new century. That region knew no setback in 1893. The humid south in the same periods increased 15, 29 and 20 per cent., *faster* through the nineties than before or since, so there was no effect of 1893 there. The west north-central states, however, added 43, 16 and 12 per cent. in these three decades. Here the growth of the nineties was barely a third as great in percentage as in the eighties, and the last decade had a growth still smaller. Growth in the mountain states was 100, 42 and 53 per cent., a great check in the second decade, with a little recovery since. But the Pacific states grew 73, 26, and 75 per cent. So British Columbia added in the last two of these decades 83 and 120 per cent. and Manitoba 66 and 79. Now cities, as is well known, must and do, under modern conditions, grow faster than their countryside. New York,* Cleveland, Columbus, Dayton, Bridgeport, and Boston* added an average of 50, 38, and 37 per cent. in the same decades that the humid north added 20, 20 and 19. That is, the cities grew fairly twice as fast as their region. Our five Pacific cities grew, on the average, 84 and 166 per cent. in the last two decades, to the region's 26 and 75 per cent., almost three times as fast as the region. It appears that the Pacific cities were held back in their exuberance by the panic of 1893, like the whole coast region, and also one may fairly wonder whether they are not growing in advance of the region's city needs.

Many cities have had a great growth for a single year, at one time or another. Philadelphia,* in the decade 1850-60, grew from 131,000 to 580,000. Minneapolis-St. Paul, in the decade after 1880, grew from 88,000 to 298,000. Birmingham, in the last decade, from 33,000 to 133,000, and Atlanta from 90,000 to 155,000. But up to the present none but the Pacific cities have kept it up, though Birmingham gives signs of it. The growth of the Pacific cities is surprising for its persistence through two decades. Most phenomenal is perhaps Vancouver, with 86 and 285 per cent. The single taxers will say this great increase is due to the exemption of improve-

ments from taxation in that city, in which case the next census must show it still in the lead.

Since 1883 all the Pacific region has been within easy reach of railroads, and the country has been open to the resources of people and money from the east. While hitherto the cities of the coast valleys had grown in response to the needs of the people on the land, the cities now became centers from which the development of the country proceeded. The resources of the coast were great, and of a sudden they became accessible to large numbers of people familiar with pioneering, and this fact did not fail to give a great impetus to settlement. Nowhere have the Pacific valleys, occupied by farmers, the same density of population to the square mile as many parts of the east, and in the more arid portions they never can have such density of population, but the taking up of the eastern land was slower because the means of occupying the land had to be created as it was occupied. Forests had to be cut away and roads and railroads built, usually with no other resources than those of the region to be served. The Pacific railroads, on the other hand, were made possible by the government of the United States, that is, chiefly by the people of the humid east. At the time of their construction the Pacific coast could not begin to pay for them. It is inevitable, therefore, that the present great growth of the coast cities will be followed by a more leisurely progress.

The active growth of Birmingham and, in less degree, of Atlanta and Richmond shows something of the same development in the "New South." What is new in the south is the putting into use of opportunities that have long existed there. People and capital and means of communication were already there, but the material resources were not developed, which really means that they were not realized. The expansion that will follow on their actual use is bound to be sudden and great. Further, the life of the south has been disproportionately agricultural. She has allowed too many of the city processes in transforming her raw products to be carried on in northern or European cities. But these processes are profitable and they profitably occupy the surplus growth of the country population, while the cities they maintain serve as cultural foci, create manifold wants and stimulate the desire to satisfy them. New Orleans is to-day the only city of over 135,000 people south of Louisville. There existed, therefore, and there exist to-day all the conditions for the growth of a group of large cities in the south, but economic conditions, largely inherited ones, have prevented these cities from springing up. This they will do presently. But

here the presence of the negro, in low economic status, must operate against exuberant growth.

Between 1850 and 1860 the discovery of gold gave a similar impetus to San Francisco. The city had 35,000 people in 1850, and the subsequent censuses were 57,000, 149,000, 234,000, 299,000, 343,000 and 417,000. It is now a very great city, with little short of 500,000 people, but its growth was never that of the New Pacific cities. The thousands gained in successive decades are 22, 92, 85, 65, 44 and 74. That is, in every decade from 1860 to 1900 it gained fewer than in the decade before, a slackening growth, though in the last decade, despite the disaster of the earthquake, it has made the best growth of forty years. The percentages of San Francisco's growth have been 63, 161, 57, 28, 15 and 22. The first two decades, 1850-70, tended towards the exuberance which the New Pacific cities show nowadays. As we have said above, the Pacific cities will not maintain their exuberance; it is of youth. We might regard San Francisco's later figures as of older type, premonitory of what is in store for the newer towns. It may, however, be questioned whether San Francisco stands in so vital a connection with the productive agricultural lands of the New Pacific as the other cities; whether the future great central city of California will not be Oakland,* at the natural railhead on Pacific waters, rather than at San Francisco, across the bay. As long as California was chiefly in touch with the rest of the nation *by sea,* San Francisco was its natural market city. With the railroad came the development of settlements east of San Francisco Bay.[2]

Oakland* is the natural market for the Great Valley, its natural supplying place. What it now lacks in depth of water the dredge may readily give it. It may naturally be questioned here why San Francisco has not had Oakland, Alameda and Berkeley counted with it, just as Cambridge, Somerville, Chelsea and Brookline are counted with Boston. Oddly enough, it does not at all help San Francisco's curve to include all these cities with it. San Francisco is so much the larger that Oakland* modifies its figures but slightly. The combined city loses through three decades instead of four, and its growth is still halting. The thousands in the combined city have been 35, 57, 161, 274, 364, 440 and 631; the decennial increments, 22, 109, 113, 90, 76 and 191; the percentages of growth, 63, 183. 70. 33, 21 and 43, amazingly like those of San Francisco alone.

[2] Readers hardly need be informed that San Francisco lies on the eastern, landward side of the peninsula that encloses the bay of the same name on the south side of the Golden Gate, while Oakland, Berkeley and Alameda lie on the eastern shore of the same bay across four miles of rather shallow water.

The fact is San Francisco is *not* showing the vitality of a Pacific coast city, whether you count it alone or together with Oakland,* but Oakland* *is* showing exuberant life, and is apparently destined presently to outstrip her elder sister. Against this result it may be expected the whole power of the wealth invested in San Francisco will be exerted, but it will only hamper a growth it cannot prevent. Oakland* is to San Francisco what Manhattan is to Brooklyn, the city of the mainland, and San Francisco has no good equivalent for Long Island for sustenance space behind it. It has with it the weight of tradition and of fixed institutions, great banks and trust companies, great hotels and the United States mint. But the importance of these beside the true function of a city—to serve well its countryside in the present—has been overestimated. We shall find another example of this in the case of Washington.

Composite Cities. Before going further with our study it is time to give a little more attention to the *composite* cities. All studies of cities and city-growth involve some consideration of the meaning given to the word "city" in each case. I have gone into this more fully in "The Anthropography of Some Great Cities."[3] We cannot be satisfied with the official city in studies that cover various dates, for we find at once that the official cities themselves change from date to date. New York, for instance, took in Brooklyn in 1898. Were there really two distinct cities up to some moment in that year, and after it one? Of course not. Nothing happened in the real, essential life of those cities in the year or at the date cited. All that happened then was that a legislature and two city councils first accepted as a fact what had been one for a long time, the essential unity of the two places as parts of a great seaport. So to-day there are many unities of city groups, real but still unrecognized by governing bodies, like Jersey City and Hoboken with New York. A state boundary in this case makes much difficulty, for the law, if not purposely hostile to change, at least makes no provision for it. If Boston's growth be looked up we learn that it added to itself in 1868 Roxbury, in 1870 Dorchester, and in 1874 Brighton, West Roxbury and Charlestown. But even better grounds than moved the governing bodies to make those changes now demand the inclusion of Cambridge, Somerville, Chelsea, and Brookline in the essential civic unit at the mouth of the Charles. All the starred cities include more than the official cities of the same name, on the ground that we ought to include all the continuous area occupied with citified houses and buildings. Are our results what they

[3] *Bull. Amer. Geogr. Soc.*, Vol. 41, 1909, pp. 537–566.

are because of proceeding thus? No, for the official cities give in each case much the same conclusions.

Some light is shed, however, on the participation of the various city parts in the community life by an examination of growth of the component parts of these cities. The composite cities are:

	Number of people in geographic city	Number of people in official city	Percentage by which geographic city exceeds official city
New York	5,454,000	4,766,000	14
Boston	913,000	670,000	30
Philadelphia	1,643,000	1,549,000	6
St. Louis	745,000	687,000	9
Cincinnati	453,000	364,000	25
Minneapolis-St. Paul	516,000	301,000+215,000	
Kansas City	331,000	248,000	34
Louisville	234,000	224,000	4
Omaha	180,000	124,000	45
Oakland	214,000	150,000	43
Duluth–Superior	119,000	78,000+40,000	

In its growth during the last century official New York has all the characteristics of geographic New York: enormous growth, steadily progressive, except for the war decade. Manhattan borough, taken alone, too, shows the same characteristics, adding the following numbers of thousands in successive decades since 1850: 298, 128, 223, 276, 401 and 481. At the same dates New York* added 543, 410, 504, 696, 1053 and 1503. Turning these into percentages of the population of each city or city part at the beginning of the decade we have:

Manhattan: 58, 15, 23, 24, 28, 26; New York:* 42, 24, 23, 24, 26, 27,

an almost identity of growth. It is seen that Manhattan suffered more than the combined city by the war, for its growth for the war decade was 15 per cent., after 58 in the decade before. New York* only declined from 42 to 24. That Manhattan was the part of the combined city most to feel the effects of the war is confirmed by the further fact that Brooklyn's growth shows no sign of any effect at all: for Brooklyn added, in the same periods, 140, 141, 179, 239, 328, 468, one of the most steadily progressive growths in the country, not even excepting Cleveland and Columbus. Official Boston, too, grew like the geographic city, the thousands added since 1850 being: 41, 72, 113, 85, 113, 110 in the official city, and 65, 99, 140, 129, 169, 145 in the geographic one. The same two checks in growth appear, if of slightly different values. The same thing is true in other cases. Duluth-Superior has components too small to yield significant data and the exaggeration in the census

figures for Omaha in 1890, while capable of fair correction by estimate, give us no data reliable enough for study.

The treatment of Minneapolis and St. Paul as one city is perhaps unwarranted, but investigation shows that each component behaves like the sum of the two. The cities do not cover the ground continuously, though they certainly will do so in the future, but each draws sustenance from the same countryside, and their increase has been singularly parallel, their decennial growths having been since 1870:

Minneapolis	34,000	118,000	38,000	98,000
St. Paul.....	21,000	92,000	30,000	52,000
Combined city.....	55,000	210,000	68,000	150,000

or in percentages:

Minneapolis	261	251	23	48
St. Paul.....	105	224	23	32
Combined city.....	170	229	23	41

The Halting River Cities. Baltimore has singular hesitancies in its growth. With 63,000 in 1820 Baltimore has added in the decades since:

(1820+) 18,000, (1830+) 21,000, (1840+) 67,000, (1850+) 43,000, (1860+) 55,000, (1870+) 65,000, (1880+) 102,000, (1890+) 75,000, (1900+) 49,000.

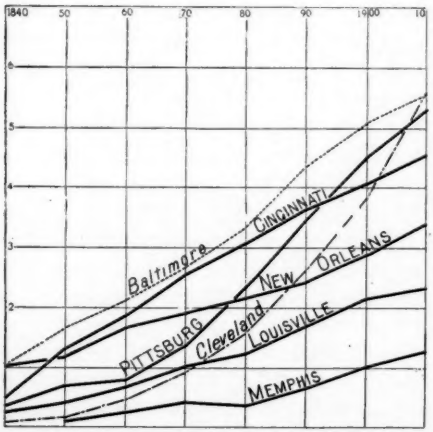

FIG. 4—The halting growth of river cities. Shows the hundreds of thousands of people in our river cities at each decade since 1840. Baltimore is included as of the same hesitating growth, and Cleveland to facilitate comparison with vigorous growth. The characteristic of these curves is the frequent occurrence of upward convexities, which indicate decades in which the city grew less than in the decade before.

Twice — in the forties and eighties — the growth was larger than for several decades after. The growth of the forties was 66 per cent. of the population in 1840, the largest *percentage* growth Baltimore ever had. This wavering of Baltimore's growth is much like that of the river cities.

It is notable that all of them except New Orleans grew vigorously through the civil war; and further, that since 1890 Baltimore has begun a definite decline

and New Orleans a definite advance. But the proper river cities are Pittsburg, Cincinnati, Louisville, Memphis, and New Orleans. All are characterized by irregular growth. Cincinnati added 84,000 to her population in the fifties, and has never equalled it since. Her next best growth was 68,000 in the seventies; next to that 58,000 in the nineties, followed by smaller numbers. In the nineties Louisville added 48,000 and Pittsburg 109,000, records that neither of them has equalled since. New Orleans's great growth was in the forties—56,000. Only in the last decade has she again come so near it as 52,000.

In thousands the decennial increases have been since 1830:

	1820–30	'30–40	'40–50	'50–60	'60–70	'70–80	'80–90	'90–1900	1900–10
Pittsburg	..	..	37	10	61	96	109	107	82
Cincinnati*	..	22	84	57	68	50	58	40	50
Louisville*	..	..	22	25	33	22	48	45	18
New Orleans.....	19	56	14	53	22	25	26	45	52
Memphis	..	..	..	14	17	(—6)	30	38	29

Perhaps Pittsburg is the most vigorous of these cities, the seat of a great modern steel industry, highly developed, protected by a high tariff and profitable. Yet in each of the last two decades it has added fewer people than in the one before. If the transference of river traffic to the railroads had any part in Pittsburg's wavering it must have been in the fifties, when the increment fell from 37,000 to 10,000. But Cincinnati* and Louisville* are the striking examples with their many fluctuations, standing, as they do, near the vigorous Indianapolis, Dayton and Columbus, which *lacked* their special advantage (!) of water transportation. Indianapolis and Louisville* had each 234,000 in 1910; their increases for the last half century have been:

	LOUISVILLE*	INDIANAPOLIS
1860–70.....	33,000	28,000
'70–80.....	22,000	27,000
'80–90.....	48,000	30,000
'90–1900.....	45,000	55,000
1900–'10.....	18,000	74,000

Cincinnati,* too, after a great addition in the fifth decade, was a good deal set back in the sixth. Never again has she added as many people as in that decade—1840-50. Is the check again, as at Pittsburg, due to decline of river traffic under the attack of the railroad? The civil war, as at Pittsburg, saw Cincinnati* readvance in population, but it is surely remarkable that a city now of nearly 500,000 has not equalled that growth in the forty years since. The growth of the city is really small: 19, 19, 11 and 12 per cent. in each of the last four decades, where Pittsburg, with all its flourishing steel industry, had 72, 46, 31 and 18 per cent. Louis-

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ville gained well during the war, fell back in the next decade, doubled her gains in 1880-90, then fell off again and added less than half as many people in the last decade as in 1890-1900.

Meanwhile all the gains are small. Owing their size and significance to their position on the Ohio, the growth of the river towns is in every case distinctly inferior to that of towns away from it. New Orleans combines with her character of river town that of seaport, shipping a considerable part of the cotton crop of the south. Greatly set back in growth in 1840-50, when she added less than two decades earlier, she grew well in the next decade, in which both Pittsburg and Cincinnati* had their growth checked so strongly, but still adding less than in 1830-40, which, indeed, she has never again equalled in fifty years. In the last four decades, in which New Orleans has been putting on a progressive aspect, her percentage growth has been 13, 12, 19 and 18—extremely small figures. The war decade naturally checked the growth of New Orleans greatly and added to the growth of the northern river cities. Many northern cities, it will be remembered, were not affected at all by the war, Chicago and St. Louis being advanced by it in population, while Manhattan and Philadelphia were checked.

The Halting Lake Cities. If we estimate the *percentage* gain of the river cities for the past three decades we find it averages 42, 29 and 17 per cent., a very small amount, Louisville* having but 8 per cent. in the last decade and Cincinnati* 12 per cent. A group of cities on the Great Lakes had fairly twice this growth, averages of 80, 56 and 36 per cent. in the same period. These are Chicago, Milwaukee, Duluth-Superior, Toledo and Buffalo. They are active cities and their growth is strong, yet with each of them the growth of 1880-90 was greater than they have attained since. In general they gained fewer people in each of the succeeding decades. Cheap water transportation is an important feature in the development of these lake cities. It was more important obviously in 1880-90 than now. Duluth-Superior, for instance, was created in the eighties, for the handling of the Mesabi iron ores, but its growth to 45,000 people in the first decade has not been equalled since; similarly with each of the other lake terminal cities. For the railroads, notably in the last decade, have succeeded in destroying the advantages of water-carriage by taking it into their own control. The railroads now own 64 per cent. of the line tonnage operating on the lakes and absolutely "control the through package freight from the western gateways to the eastern seaports via Buffalo." Tramp freighting

is made profitless by charging higher rail rates east on all goods that have been carried on the lakes. Thus oats can be carried from Chicago to Buffalo by tramp steamer for 3 cents per 100 lbs., against 6½ cents by rail. But the railroads have been asking 14 cents from Buffalo to Philadelphia on oats that *came by water,* against 7½ cents on oats that came to Buffalo by rail! Detroit showed the halting growth of the other lake cities until about 1906, when the automobile industry took its great growth. From that time on her growth has been very vigorous, as appears on Fig. 5.

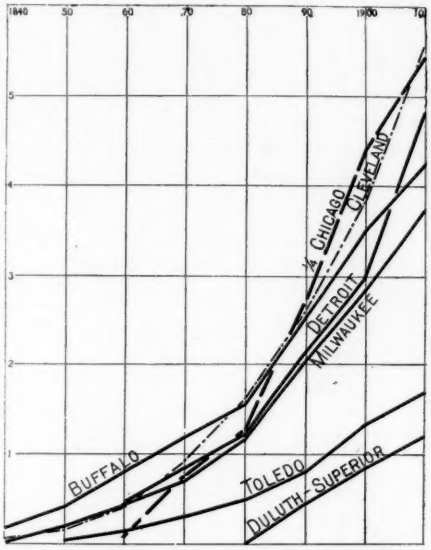

FIG. 5—Recent check in growth of the lake cities. Shows the hundreds of thousands of people in each since 1840. Chicago has been taken a quarter of its size to get it on the same diagram with its much smaller neighbors. Its *rate* of growth is not thereby changed. The special feature in all but Cleveland and Detroit, which are of *vigorous* growth, is a spurt of growth in 1880, which has been slackening up ever since Detroit shows the same tendency up to the beginning of the recent development of automobile factories. Apparently, lake navigation had a great expansion in 1880, and has been suffering from atrophy since.

Cleveland, as the same diagram shows, has not shared in these movements. Cleveland is a terminus of lake traffic only for iron ores from Duluth for Pittsburg, which is wholly in the control of the steel and iron interests, with which the railroads have not interfered.

It must become evident from these diagrams that transportation monopoly has not merely profited individual corporations unduly, but that it has seriously checked the growth of great cities.

The increments of all the lake cities in thousands since 1870 have been:

	1880	1890	1900	1910
Chicago	204	597	598	487
Milwaukee	45	88	81	89
Duluth–Superior	..	45	39	35
Detroit	38	94	82	186
Toledo	18	31	51	36
Buffalo	37	99	96	72
Cleveland	67	101	121	179

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This appears to be the same retardation that the river cities underwent, though it affects the lake cities far less.

It was noted above that the lake cities are still making excellent growth and an average percentage growth cited for the past decade of 36 per cent. This is usually regarded as the most accurate way to state the growth of population, the percentage of the number at the beginning of a period which is added during the period; for the increase ought, in some measure, to be proportional to the numbers involved. In the last decade Chicago gained 29 per cent., Milwaukee 31, Duluth-Superior 41, Detroit 63, Toledo 28, Buffalo 20 and Cleveland 47. The river cities gained: Pittsburg 18, Cincinnati* 12, Louisville* 8, Memphis 28 and New Orleans 18.

On marking the percentage gains for the whole country it is found that they fall into much the same groups as when the

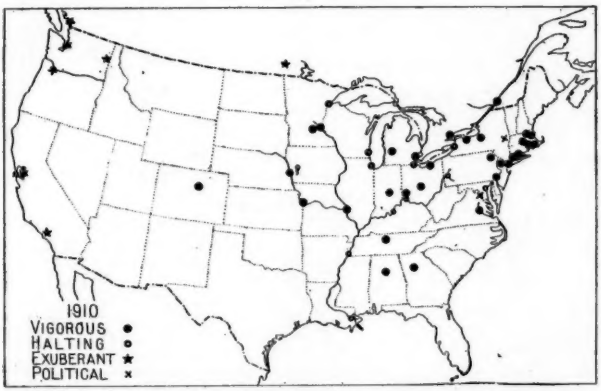


FIG. 6—The map shows how the cities of the three main types fall into geographic groups. The exuberant ones on the Pacific, the vigorous ones in the humid East, the halting ones on the rivers and lakes, with the two seaports, San Francisco and Baltimore. As the lake cities are only a little checked in their growth, and mainly in the two or three last decades, their circles are drawn more nearly solid than those for the river cities. Albany and Washington are located by crosses.

growth or diminution of their decennial increments is studied. Thus seven New Pacific cities gained on an average 193 per cent. in the last decade, taking the average of the percentages for the individual cities, so that to each city is given as much weight as another, regardless of its size. Four cities of the New South, 99 per cent.; fifteen cities of the interior-north, between lakes and rivers, 45 per cent.; five lake cities, 30 per cent.; eleven cities of the Atlantic-north, 23 per cent.; five cities of the river-interior, 16 per cent.; like San Francisco and Baltimore, Washington, 19 per

cent., and Albany, 6 per cent. London, it may be noted for comparison, is adding about 10 per cent; Paris and Berlin, 12 per cent.; Vienna, 22; Budapest, 37, and Sydney, N. S. W., 27. The lower American values, in other words, are rather high ones.

Political Capitals. It would seem, at first sight, that the seat of government of a great state was a place peculiarly favored. The case of Albany seems to put this in doubt. In fact the growth of the other cities along the line from New York to Buffalo and some special features in Albany's geographical position suggest rather that Albany would have been much better off had it *not* been the state capital. Its growth is the worst of all American cities (Fig. 2). Indeed, it has hardly grown at all since 1880. The national capital, Washington, had a normal growth up to 1874, but since that time, when its management was taken from the citizens and put in the hands of a committee of Congress, its growth has been halting: 69,000, 52,000, 49,000 and 52,000. It is a city without significant manufactures or commerce, the creature of law rather than environment. We had ten larger cities than Washington in 1880; now we have eighteen larger.[4] Its curve is shown on Fig. 2, with Albany.

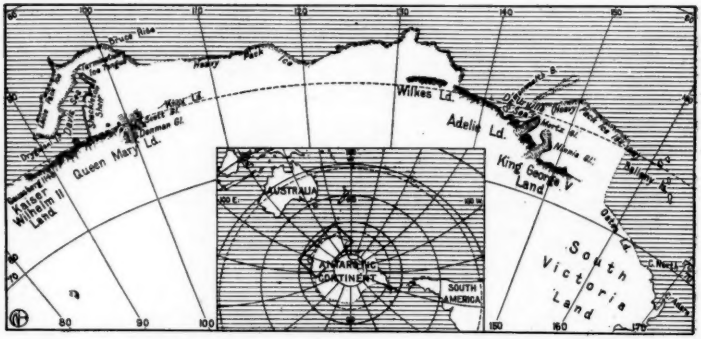
European capitals have usually grown *naturally,* by commerce and industry, and become capitals by virtue of their geographic and economic importance. The significance of a capital is necessarily much greater under a monarchical government than with us. But all the cases here examined point out the close, vital relation of a city, at least with us and our Canadian neighbors, to its environment. It is not laws nor enterprises of groups of energetic men that make cities, but *service* to their region. Hinder them in this service, as the railroads have done in stifling competition of lake and river carriage, and very great diminutions in the growth of population immediately result. It is probable, if this interpretation is correct, that the railroads have punished themselves severely by depriving themselves of potential patrons.

[4] Cleveland, Detroit, Minneapolis-St. Paul, Toronto, Montreal, Kansas City, Buffalo and Milwaukee having all outgrown Washington in the interval.

THE AUSTRALASIAN ANTARCTIC EXPEDITION, 1911–1914*

The *Bulletin* has recorded from time to time the plans and progress of this expedition, with statements of the results as they have come to hand.[1] Sir Douglas Mawson, leader of the expedition, in his paper read before the Royal Geographical Society on June 19, supplied a comprehensive account of the entire work, with a summary of the scientific results.

The object of the expedition was to investigate the Antarctic Continent to the south of Australia, a region where the continent was supposed to extend far to the north, but concerning which only the most scanty information was at hand. Since 1840 no man had been within the limits of the Antarctic Circle



Map of the portion of the Antarctic Continent explored by the Australasian expedition, based on a map, in colors, in the *Geogr. Journ.*, Sept., 1914. Scale, 1:32,000,000.

The inset shows the extent of the main map and the relation of the Antarctic Continent to Australia and South America. See p. 39, note 2.

in the region selected by Mawson as a field of operations. The only information concerning this region was the following:

(1) In 1839, Balleny, in the sealing vessel *Sabrina*, reported the appearance of land near the Antarctic Circle in long. 120° E. It was chartered as Sabrina Land, but the Australasian expedition proved it to be non-existent.

(2) A French expedition under Admiral Dumont D'Urville, sailing south from Hobart in 1840, came within sight of about 150 miles of an Antarctic coast line, within the Antarctic Circle, between long. 136°30′ E. and 142° E. He named it Adelie Land. The Australasian expedition confirmed the existence of this land.

(3) Lieutenant Wilkes of the United States expedition of 1840 "reported sighting land at frequent intervals during a long voyage from east to west

* Condensed from the *Geogr. Journ.*, Vol. 44, 1914, Sept., pp. 257–286, 5 sketch maps, map in colors and ills.

1 Vol. 43, 1911, pp. 370–371; Vol. 44, 1912, pp. 122, 523–525, 918; Vol. 45, 1913, pp. 137, 448, 527, 691, 930.

close to the Antarctic Circle and in the very region to which our own [Mawson's] efforts were directed. Many of these reports of landfalls we have found to be erroneous. Notwithstanding such discrepancies, Wilkes's work is of much value. He outlined the northern edge of the pack, as it existed in 1840, and supplied several shallow soundings more convincing as to the proximity of land than his otherwise vague and oftentimes ill-founded statements. While criticizing the work of Wilkes, however, the magnificent seamanship and heroic determination of the leader should never be forgotten. The hazardous voyage of the *Vincennes* through 2,000 miles of ice-strewn sea in high southern latitudes, a zone where gales are frequent even in summer, will ever remain a great achievement.''[2]

The vessel fitted for the work was the *Aurora*, of 600 tons. Captain J. K. Davis was appointed master of the *Aurora* and second in command of the expedition. On the southward voyage a party was to be left at Macquarie Island. Wireless telegraphy was to be used for the first time in polar exploration, the Macquarie Island station transmitting Antarctic news to Hobart. The Macquarie Island party comprised five persons; the staff at the main Antarctic base, Adelie Land, included, besides Dr. Douglas Mawson, Lieut. R. Bage, astronomy, magnetics and tides; C. T. Madigan, meteorology; J. G. Hunter, biology, F. L. Stillwell, geology, and twelve others. Mr. F. Wild was appointed leader of the staff at the western Antarctic base with seven assistants.

The *Aurora* sailed from Hobart, Tasmania, on Dec. 2, 1911. Macquarie Island was sighted on Dec. 11. The habitable island is over twenty miles long and its greatest breadth is 3½ miles. The chief vegetation is tussock grass and Kerguelen cabbage. The island has a remarkable population of birds and animals; sea-elephants are numerous and the place was once a favorite haunt of the valuable fur seal which the early sealers almost exterminated. Here a hut, cold storage plant and instruments for a year's work were landed. Eventually the wireless station was erected 350 feet above sea level.

Steaming south from Macquarie Island, the first ice was met in lat. 64° S. and further progress was much impeded until the afternoon of Jan. 6, when an ice cliff loomed ahead extending to the horizon in both directions. This proved to be an immense barrier tongue of ice—afterwards named the Mertz Glacier—pushing sixty miles out to sea from a great ice-capped land which had never been seen before. The *Aurora* steamed along this land for the next two days. Its continuity with Adelie Land was later proved and it was then

[2] On his map, in colors, Sir Douglas Mawson names a short stretch of the coast to the west of Adelie Land "Wilkes Land." It has, for years, been the practice of cartographers, in nearly all the map-making countries, to extend the name Wilkes Land along that part of the continent whose coasts he skirted, for a reason that was well expressed by Rear Admiral J. E. Pillsbury, U. S. Navy, in the *U. S. Naval Institute Proceedings*, Vol. 36, 1910, p. 468:

"This investigation establishes Wilkes's priority over D'Urville. The English sealer Balleny, in 1839, got a glimpse of land in about 121° East, but all he says regarding it is: 'saw land to the southward.' Neither D'Urville nor Balleny had any notion or made any suggestion that they were on the edge of a continent. Wilkes, on the contrary, not only sighted at frequent intervals some 1,600 miles of this coast but he recognized that it must be part of a continent. The name he gave to this land, the Antarctic Continent, must belong to the entire continent, the existence of which he revealed. Some geographers have recognized that the part of Antarctica he discovered needed a special name and therefore gave it the name of Wilkes Land. When it is remembered that Wilkes changed the conception that the Antarctic was an ocean, by demonstrating that it was a continent, the least that his discoveries demand is that the name of Wilkes Land be retained on all of Antarctica lying between the longitudes of 95° and 158° East."

decided to include it under the same name. The land rose everywhere from the sea to form a plateau. Only rarely did portions of the rocky platform break through the ice-sheet. Numerous rocky islets fringing the coast line are admirable breeding grounds for marine birds.

Some miles from the nearest portion of D'Urville's Adelie Land a suitable spot was discovered for a wintering station. This was a rocky outcrop, over a mile in extent, thenceforth known as Cape Denison. Rocks projected here from under the ice sheet within a sweeping indentation of the coast line which was named Commonwealth Bay. The coast here is dangerously bordered by rocky islets and reefs.

Upon discovering the wind-swept and desolate nature of this great land mass, Mawson decided to establish only two bases, amalgamating the smaller of the subsidiary bases with the main base. "In the light of subsequent events it was well we did this, for the climate and consequently the exploration of Adelie Land proved to be the toughest task on any yet known Antarctic land." By Jan. 19, the whole of the stores and gear of the main base were transferred to the shore. Then the *Aurora* started westward with the party under Mr. F. Wild. The stretch of navigable sea seen by D'Urville and Wilkes in 1840 was named D'Urville Sea. The coast of Adelie Land could be traced in a westerly direction, but on account of heavy pack the vessel could not follow along the coast, the only course being to skirt the heavy ice to the north and west. Following the heavy pack westward the coast of what Mawson calls Wilkes Land, about 132°-135° E. long., was noted on the chart. This was the last land seen until the icy slopes of land were discovered extending east and west as far as the eye could reach in lat. 66° S. and long. 94°23′ E.

The sphere of operations of the German expedition of 1901 was now near at hand, for their vessel, the *Gauss*, had wintered, frozen in the pack, about 125 miles to the west. The land to the south, which the Germans visited by sledge over the pack ice, was eventually proved to be continuous with the land now sighted by the *Aurora*. The "high land" in the direction of Wilkes's Termination Land, seen by the Germans during a balloon ascent, was found to be a high ice-sheathed island about nine miles in diameter. To this the name of Drygalski Island was given. The position marked for Termination Land on Wilkes's charts proved to be occupied by pack ice and a barrier-ice formation (marginal shelf-ice). "The formation in question, trending about 180 miles to the north from the newly discovered land just referred to, was found to be very similar in character to the well-known rock barrier over which lay part of Scott's and Amundsen's journeys to the South Pole. This we named the Shackleton Ice Shelf. Its height is remarkably uniform, ranging between sixty and one hundred or more feet. Making allowance for the average specific gravity, this indicates an average total thickness of perhaps 600 feet. In area it occupies many thousands of square miles."

This wonderful block of ice originates from the glacier flow over the great plateau-land to the south. Every year an additional layer of consolidated snow is added to its surface by the frequent blizzards. These annual additions are marked on the face of the ice-cliff. A limitation is placed upon its increasing thickness, for the whole mass is ever moving slowly to the north, driven by the irresistible pressure of the land-ice behind. With this advance its northern face is crumbling away before the action of the sea, breaking down into bergs and brash-ice.

Much later the phenomenon of the breaking down of this cliff face was observed: "Suddenly a mass weighing perhaps a million tons broke away, first sinking down into the sea. Then followed an interval of a few minutes during which it majestically rose and sank alternately accompanied by a rapid splitting up. At the end of five minutes, only small bergs and brash-ice remained."

When the *Aurora* came within sight of the new land, Wild made a short journey towards it over the ice and, on his return, reported that the land was still twenty-five miles from the point he had reached and the ice was breaking up. Eventually a location was chosen for landing the party on the Shackleton Ice Shelf about seventeen miles from the land itself, the nearest approach possible by the ship. Here the hut, stores, coal and instruments were hoisted to the top of the cliff. The *Aurora* steamed away on Feb. 21, and when she ended the journey of 2,300 miles to Hobart, on March 12, nine tons of coal were all the ballast remaining.

The vessel was refitted in Sydney and deep sea dredging gear erected to secure samples of the bottom life in the deep ocean. She started on May 20, 1912, southward to investigate the ocean floor between Australia and Antarctica. A second cruise was made between Nov. 15 and Dec. 15, 1912. A large part of the work of both these voyages was the delineation of the floor of the ocean. The two most important results of these cruises were, first, the discovery of a submerged island-like plateau southward of and about the size of Tasmania; secondly, a trough depression was found to separate Macquarie Island from the Auckland Islands and others which stand upon the same submarine platform as New Zealand.

The main base party in Adelie Land prepared for autumn sledging and the journey began on March 1, 1912. The weather was bad and became worse on March 2, so that the party returned, leaving a loaded sledge on the plateau. From that date there was no slackening of the wind until far on in the spring. The sledge was not recovered until late in August. The party led a strenuous existence at winter quarters, buffeting with a sea of drifting snow. The average wind velocity for the whole year was fifty miles an hour. Hourly velocities of one hundred miles and more were common, and twenty-four hourly averages of over ninety miles were recorded. Pebbles were lifted and structures not buried in the *névé* were thrown down. Only a portion of the roof of the hut remained above the snow. Entrance to the hut was effected in fine weather by a trap door in the roof; at other times through tunnels in the *névé*. Such weather lasted almost nine months of the year. Even in the height of summer, blizzard followed blizzard in rapid succession. The winter quarters were near the center of a permanent anticyclone. The sledging gear was modified to meet the remarkable circumstances. Tents such as were used in the Ross Sea area were torn to ribbons. Two underground rooms were therefore excavated in the glacier ice at 5½ miles and 11¾ miles from the hut where stores were accumulated for the summer sledging campaign. Not until November 7 was there sufficient moderation in the weather for a final start. Five diverging parties worked simultaneously so that a maximum of new ground was covered during the short sledging season.

Stillwell and two others mapped the coast line to the east as far as Mertz Glacier. They found a great number of rocky islets fringing the mainland. Silver, antarctic, Wilson and snow petrels, cape pigeons and other birds were

found nesting in large colonies. Further east, Madigan and two others reached 67°14′ S. lat. and 150°21′ E. long., found the sea frozen east of Mertz Glacier, crossed the fifteen-mile-wide tongue of the Ninnis Glacier and visited several headlands by the way. Near Horn Bluff, a sweep of coast line, bounded by rocky cliffs, is 1,000 feet high. There they discovered coal and carbonaceous shales outcropping at an elevation of several hundred feet, associated with red sandstone and capped by an immense thickness of columnar dolerite. Nearer to winter quarters only gneiss and schists are exposed. The land east of the Mertz Glacier was named King George V Land.

Mawson, Ninnis and Mertz made a sledge journey across King George V Land that ended most tragically. Their purpose was to map the coast beyond King George V Land; and they took with them all the dogs, the other parties hauling their sledges themselves. On Dec. 14, 1912, when they had traveled outward 311 miles over moving ice (glaciers) that was heavily crevassed, and were crossing the coastal highlands in 68°54′ S. lat., 151°33′ E. long., Ninnis, with his dog team and sledge, broke through the roof of a *névé*-covered crevasse and fell into an unfathomable depth below. Ninnis was doubtless killed instantly. All the dog food and most of the man food were lost on this sled. Under the circumstances, Mawson and Mertz, with six dogs, immediately started back towards the winter camp. Delayed by bad weather, the slender rations had to be reduced still further. The dogs gave out daily and the little flesh which they provided contained a minimum of nutriment and was difficult to digest. Still they struggled on and, in the first week in January, 1913, they were within 100 miles of the camp. But they were starving, and about midnight, on Jan. 7-8, Mertz passed away. After three weeks of creeping forward, Mawson came upon a cache of provisions, twenty miles from the hut, and was able finally to reach headquarters.

Of the other summer sledging parties from the main base one was led by Bage to the south, inland over the plateau, and another by Bickerton over the highlands to the west. After leaving the coast no sign of rock was seen, their track lying over a desolate wind-swept plateau. The wind seldom ceased; drifting snow was the rule, and the constant flow of air had cut, in the plateau surface of Adelie Land, deep *sastrugi* of such dimensions as are not met with elsewhere.[3] Over these obstacles they dragged their sledges, in the face of the wind, for 300 miles out from the hut, nearly to the magnetic pole. There an elevation of 6,500 feet was reached. Hodgman and two others formed the western party. It passed over the highlands of Adelie Land seen by D'Urville, coming close to the coast in lat. 66°33′ S., long. 138° E. where they saw the frozen sea to the west. One of the points of special interest was the finding of a piece of rock, a pound or two in weight, lying on the surface of the inland ice sheet far from any *nunataks*.[4]

Captain Davis sailed from Hobart to relieve the wintering stations on Dec. 26, 1912. He reached Commonwealth Bay on Jan. 12. All the sledging parties excepting that of Dr. Mawson appeared during the following two days. Davis made arrangements to leave a search party to remain for another year. He

[3] Dr. Mawson apparently meant troughs. The word *sastrugi* is used in Siberia to indicate ridges of wind-blown snow running parallel with the direction of the air currents. It has been employed by Peary and other Arctic explorers in this sense.

[4] This rock, according to Mawson, was quite unusual in appearance and may prove on examination to be a meteorite.

took on board all except the six men who were to remain and started on the 1,500 mile voyage to relieve Wild and his party at the western base. That evening, when fifty miles out to sea, Hannam, at the wireless receiver on the *Aurora*, heard of Mawson's return to the hut. A hurricane arose and prevented the ship from returning to his relief, so the vessel pushed through the pack at the north of D'Urville Sea and shaped a course westward. The western base was reached on Feb. 22, the men there and their collections were taken aboard, the ship departed at 9 P. M. on the same day and reached Hobart on March 15, 1913.

Mr. Wild with five other men had set out on March 13, 1912, to reconnoiter the coastal slopes of the mainland and establish two caches for sledging operations later in the year. A point 2,000 feet above sea level and thirty-five miles from the hut was reached. The snow buried their hut at winter quarters, and store houses were made by driving tunnels and chambers out in all directions into the snow. The floe ice had broken up at the end of summer and, until the following summer, seals or penguins were not to be had. The winter of 1912 was marked by frequent blizzards and heavy snowfall. On August 20, Wild with five men assisted by three dogs (all that remained) set out on a depôt-laying journey to the east. The food was cached on the Shackleton ice sheet eighty-four miles out. Temperatures as low as —47° Fahr. were experienced. Small *nunataks* and large islands were seen rising from the ice peak, and rocky cliffs appeared along the coast line of the mainland. It was found that the inland ice sheet, pressing forward, kept continually overthrusting great avalanches of ice, from one of which they had a narrow escape.

About the end of September, Jones, Dovers and Hoadley started to lay depôts over the sea ice to the west. About the same time Wild, Kennedy and Watson reascended the highlands south of their winter quarters. The summer sledging began at the end of October and early in November, one party going to the east, the other to the west. Starting on October 30, the eastern party, led by Wild, gained the depôt eighty-four miles out, and found the food, but the sledge that had been left to mark the spot, standing vertically and stayed with ropes, was not found. The wind had carried it away. At 120 miles east of their hut they came to the Denman Glacier, which descends into an embayment of the coast and then pushes out through the Shackleton ice shelf. Watson says that, viewed from the Shackleton ice shelf, right to the southern horizon is to be seen a stream of broken upturned ice, descending by cascade after cascade, and finally by still mightier cascades, till it reaches the level of the sea. It falls 3,000 feet in fifteen miles. Moving on, it meets and absorbs tributary flows, fills the whole bay with its maze of ice confusion and, spreading fan-fashion, sweeps on to the north in wide and widening billows of upturned impassable ice. It ploughs its way through the more sluggishly moving ice shelf. At the point of conflict at the sides there are mighty pressure ridges ranging up to 400 feet in height. Sea water was present in many cracks and crevasses. Although the seaward face of the shelf was over 100 miles away, the shelf had been rent to the bottom. An attempt was made to cross this chaos of ice, but it had to be relinquished. The party returned to the hut on Jan. 6.

The western party, Jones, Hoadley and Dovers, set out on Nov. 7 over the ice slopes and found progress very slow on account of the numerous crevasses. After a journey of 215 miles (not counting relays) they reached Gaussberg,

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connecting with the work of the *Gauss* expedition. They returned to the hut on Jan. 21. The rocks met *in situ* on both these sledge journeys were crystalline schists and gneisses.

Summing up the expedition it may be said that new lands and islands were discovered and journeys were made over the sea-ice and the continental plateau in regions that had never been sledged over before. From the main base, journeys aggregating 2,400 miles were made and, from the western base, journeys of 800 miles. The land was followed through thirty-three degrees of longitude, twenty-seven degrees of which were covered by sledging parties; a fundamental meridian was established in Adelie Land, using wireless telegraphy; the continental slope was indicated by soundings and in most cases the continental shelf itself through fifty-five degrees of longitude; Macquarie Island was mapped. Extended observations were also made in the fields of terrestrial magnetism, biology, glaciology, meteorology, bacteriology, tides and auroral phenomena.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Meetings of the Society. The second meeting of the Society for the season 1914-1915 was held in the Engineering Societies' Building, No. 29 West 39th Street, on Tuesday, November 24, 1914, at 8.30 o'clock, Vice-President Greenough in the Chair.

The following persons, recommended by the Council, were elected Fellows:

Benjamin Garcia Aparicio,
William Rutger Britton,
Edmund L. Baylies,
O. D. von Engeln, Ph.D.,
Alexis Everett Frye,
W. H. Fitchett,
Herbert H. Gowen, D.D.,
Herbert Spencer Harde,
Mrs. Julia R. Riker Harmon,
Barrington Moore,
Henry J. Patten,
Gorind Prasada, B.A.,
Ingral A. Selsing,
R. Speight, M.A., M.Sc., F.G.S.,
Charles Tower.

Mr. William Webster Ellsworth addressed the Society on "The Political Geography of Europe as Affected by Its Wars." The lecture, illustrated by many maps and other views, was heard by a large and interested audience.

On Tuesday evening, December 8, an extra inter-monthly meeting was held at the Engineering Societies' Building, at which Arthur Stanley Riggs addressed the Society on "Northern France." Lantern views were shown.

Resignation of Dr. David Randall-MacIver. At the meeting of the Council, on November 19, Chairman Greenough read a letter from Dr. David Randall-MacIver resigning his position as Librarian of the Society for the reason that he felt it his duty as an Englishman to proceed to England and place his services at the disposition of the British government. The Council adopted the following:

"The resignation of Dr. Randall-MacIver is accepted with regret, and the thanks of the Council are extended to him for the zeal and energy displayed by him while in the discharge of his duties here."

The Secretary was instructed, when advising Dr. Randall-MacIver of the action taken, to assure him of the friendship, respect, and good wishes of the Council.

Mr. Edmund L. Baylies Elected to the Council. The Council, on Nov. 19, elected Mr. Edmund L. Baylies a Councillor of the Society.

The Society's Exhibitions. The attendance at the Society's exhibition room, since the collection of maps illustrating the war was placed on view and up to Nov. 19, was 18,519 persons. The fine collection of views of the Philippines loaned to the Society by the Bureau of Science, Manila, is also attracting much attention.

Sir Douglas Mawson to Lecture in New York. Sir Douglas Mawson, the explorer of Wilkes Land, will lecture in Aeolian Hall on Sunday evening, Jan. 17, 1915, at 8:30 P. M., under the joint auspices of the American Geographical Society and the American Museum of Natural History. In his lecture, which is entitled "Racing with Death in the Antarctic Blizzards," he will describe the notable explorations of his party in Wilkes Land (1912-1913), illustrating his discourse with stereopticon and motion pictures. A circular has been sent to our members informing them of the cost of tickets and where they may be purchased.

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GENERAL

Effects of the War on Exploration and Geographical Work. *Deutsche Rundschau für Geographie* (Vol. 37, No. 1) says that practically all exploring expeditions in the colonies of countries now engaged in war have given up their enterprises. A few of these parties, however, have not yet been heard from. The Austrian Antarctic Expedition, which was to sail for Weddell Sea under the leadership of Dr. König in August, has been abandoned. Dr. von Handel-Mazzetti, the phytogeographer, and his party, who had already reported the first results of their work in China, are now believed to be stranded there. Shortly before the war began, Dr. B. Schulz's oceanic expedition started for the Pacific Ocean on H. M. S. *Möwe*, and nothing has yet been heard of the party. The expedition sent out by the Hamburg Observatory to study the eclipse of the sun in South Russia was fortunately able to reach Bucharest in safety. A number of zoologists who left Germany for Teneriffe are unable to get home; this is also the case with a party that went from Prussia to Spain to make botanical-zoological studies and with the Göttingen expedition for the exploration of a part of the interior of German Southwest Africa.

Petermanns Mitteilungen for October says that Prof. F. Machatschek, of the University of Vienna, who was making geomorphological studies in Russian Turkestan and was about to leave Andishan for the Altai Mountains, was compelled to suspend work at the outbreak of the war and is now detained by the Russians at Tashkent.

Dr. Hermann Haack, the Editor of *Geographischer Anzeiger*, one of the ablest and most energetic members of the geographical staff of the house of Justus Perthes, Gotha, returned from a vacation trip to Sweden recently, and immediately entered the German army. During Dr. Haack's absence the editorship of this periodical will devolve upon Professor Heinrich Fischer.

La Géographie, the monthly magazine of the Paris Geographical Society, announces that it has suspended publication for the present because so many men of the working staff have joined the army that it is now impossible to prepare and issue the publication.

Deutsche Kolonialzeitung, the organ of the German Colonial Society, also announces its suspension, which is due, it says, to the fact that, as communications with the German Colonies has been cut off entirely, it has no material for publication.

Our Weather Bureau announced on Aug. 6 that, owing to the war in Europe, the meteorological observations from Europe and Asia heretofore used in the construction of its charts of the northern hemisphere were no longer received. The publication of the map is therefore suspended until such time as the reports can be resumed.

NORTH AMERICA

Eruption of Pavlof Volcano. We are indebted to the Coast and Geodetic Survey for this extract from a letter written by Captain James B. Miller, commanding officer of the U. S. Coast and Geodetic Survey vessel *Patterson*, giving the following details of a volcanic eruption on July 6, 1914, probably of Pavlof Volcano, about seventy-five miles east of the western extremity of the Alaska Peninsula:

"On July 6, a barometric depression was located over the Shumagin Islands, with the barometer at 29.15 inches, stationary . . . The *Patterson* was in the vicinity of Korovin Island. At 12:18 P. M. (157°30′ meridian standard time) several distant explosions were heard, repeated at irregular intervals of ten to thirty minutes until about 3 P. M., bearing W. by N. (magnetic). Pavlof Volcano lay in that quarter, fifty miles distant. At the same time (12:18 P M.) fine black volcanic cinder began to fall, mingled with rain; and a thick black cloud began to pass overhead from the westward, at times touching the sea, but generally 500 to 700 feet above it. . . .

"It is estimated that more than one ton of the cinder fell on the vessel's decks; three hundred pounds were collected, filling half a barrel; it is of the same character as all the old deposits in the vicinity of the mountain, but finer;

and it is identical with almost all the sea bottom of the region. Only a faint sulphurous odor was noticed while the cloud was passing. . . .

"It was reported from Belkofsky, near the base of Pavlof Volcano, that the eruption began on the night of July 5 or morning of July 6. The earlier explosions were not heard on the *Patterson*, possibly because they were weaker, or because at that time there was land between; the dust cloud and ash fall no doubt originated then. No cloud or ash fall was observed, which might have been caused by the explosions of 12:18 P. M. or later; this cloud may have gone in a different direction; or there may have been very little ashes thrown out by these explosions. Large amounts of ashes were later observed on the slopes of the mountain, down to the water's edge, covering the vegetation. The actual depth of ashes was not measured at the base of the volcano."[1]

The New York State Board of Geographic Names. The *Bulletin* (May, p. 365) printed the Act of the Legislature creating this Board. Governor Sulzer appointed Arnold J. F. van Laer of Albany, Hugh P. Baker of Syracuse, and H. L. Fairchild of Rochester as members of the Board which is expected to become an organic part of the University of the State of New York. The Board has prepared a list of the place names of Albany, Schenectady, and Rensselaer Counties, which is printed in the *Bulletin of the New York State Museum*, No. 173. The opinion is expressed that the thorough prosecution of such work as this will "form a useful series of documents bearing upon the historic development of settlements in the state." The list shows the origin of the place names in these counties and other facts relating to many of them.

The Eruptions of Lassen Peak. The information prepared by Professor R. S. Holway relating to the recent volcanic activity of Lassen Peak and reprinted in the *Bulletin* for October (pp. 740-755) has been brought down to a later date in a paper prepared by Mr. Diller of the U. S. Geological Survey.[2] Our *Bulletin* published a list of twenty eruptions occurring from May 30 to July 15, 1914. Mr. Diller records 32 eruptions from May 30 to August 23. The eruption at 5:28 A. M. on Saturday, July 18, was by far the most violent to that time. It lasted practically the entire morning and ejected dust to a height of 11,000 feet. The outbreak of August 21 was one of the most severe and continued an hour and forty minutes, the column rising to a height of 10,560 feet. The crater increased in size with the number of eruptions. On July 23, after twenty-four eruptions, the crater was over 650 feet long, 100 to 200 feet wide, and about 150 feet deep. The material ejected ranges in size from fragments four feet in diameter to fine dust. When Mr. Diller examined the crater on July 23 he found it larger and emitting a greater quantity of steam more generally distributed over the crater bottom than on June 20, when his first examination was made. Nearly all the hot springs and solfataras about Lassen Peak have been visited and there is no evidence of increased intensity in the solfataras since the eruptions from the summit began. The eruptions will probably end in establishing a solfatara on the summit of Lassen Peak, but it should be closely watched for earth tremors and evidences of deeper seated action, and visitors should approach it with caution.

Destruction of Islands. Quantitative data on the rate at which physiographic agencies carry on their work are always of interest. J. F. Hunter has published such a study of wave work in Maryland (Erosion and Sedimentation in Chesapeake Bay around the mouth of Choptank River, *U. S. Geol. Surv., Prof. Paper 90-B, 1914, pp. 7-15.*) The opportunity to secure precise data as to the changes in these shore-lines comes from the fact that the U. S.

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[1] Note by the Coast and Geodetic Survey office: The area of the spar deck of the *Patterson* is about 4,300 square feet; therefore the fall of ashes was at the rate of 6,000 or 7,000 tons per square mile.

[2] The Eruptions of Lassen Peak, Cal. By J. S. Diller. *Bull. Seismolog. Soc. of Amer.*, Vol. 4, 1914, No. 3, pp. 103-107.

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Coast and Geodetic Survey made large-scale maps of the same areas in 1848 and again in 1900-1901. For a small area on the eastern shore of Maryland, Hunter and Yates repeated the survey in 1910, so that three sets of accurate maps on the scale of 1:20,000 were available.

Sharps Island illustrates the changes which were found. It decreased in area from 438 acres in 1848 to ninety-one acres in 1900, while in 1910 only fifty-three acres remained. More than four-fifths of the island has disappeared. On the northern coast the shore-line receded about 1,690 feet in fifty-two years, and over 1,100 feet more in the next ten years. This is at the rate of thirty-two feet a year for the fifty-two-year period, increasing to 110 feet a year during the decade ending in 1910. Hunter shows that this wave-cutting took place in unconsolidated clay, marl, sand, and gravel of the Columbia formation, with cliffs seven feet or less in height. He estimates that Sharps Island will entirely disappear by 1950. In low-lying tidal marshes the rate of destruction is very slow.

Deposition of the material worn from the cliffs was also studied, about a third of the total area investigated beneath the waters of the bay showing either sedimentation or scouring. Of this region of measurable changes, a fifth indicated filling, while four-fifths were deepened. He concluded that about 60 per cent. of the material eroded from the cliffs was carried further down the bay. The paper is illustrated by an excellent map on the scale of an inch to the mile (1:62,500), showing (a) the positions of the shore-lines at the times of the three surveys and (b) the areas of scouring and of filling.

LAWRENCE MARTIN.

Snowfall and Cyclones in the Eastern United States. Comparatively little attention has been paid to the distribution of precipitation by cyclones. We summarize our rainfall data by days, months and years, but the amounts brought in individual cyclones are seldom considered. Mr. William G. Reed has taken up the question of the cyclonic distribution of rainfall in the United States (*Monthly Weather Rev.*, 1911, pp. 1609-1616); and now Dr. Charles F. Brooks has discussed the detailed distribution of snowfall in two well-marked storms, that of February 10-14, 1899, and that of February 20-23, 1912 (*ibid*, 1914, pp. 318-330). The data used in Dr. Brooks' work were those of 800 to 1,000 voluntary observers, so that the charting is very complete. So far as conclusions may be drawn from these two particular storms, it appears that the snowfall is spread over a wide territory on each side of the track of the center, the heaviest snowfall coming with northeast winds over a belt about 100 to 200 miles north of the track. The northwest winds, in the southwest quadrant, sprinkle light snowfall over the country to a distance of about 300 miles south of the track of the center. Local topography and other controls make the distribution of the snowfall "patchy." R. DEC. WARD.

Glaciers in the United States. The moderate-sized but easily accessible glaciers of the western United States should come to be better known through the publication of good maps and descriptions such as two recently issued by the Department of the Interior.[1]

Of the ice masses in Glacier National Park the Blackfeet Glacier is the largest, covering three square miles. It is wider than long, having no valley tongue. It terminates 5,725 feet above sea level and moves forward at the rate of three inches a day. Within the park there are at least ninety small ice masses to which the name glacier may be applied. The most notable and interesting feature of Glacier National Park, however, is not the tiny ice masses, but the topographic forms produced by their much larger predecessors, as described by Mr. M. R. Campbell in another publication. A most effective map, showing the maximum extent of glaciation in this part of the Front Range of the Rockies and the adjacent part of the Great Plains, has been prepared by Mr. Alden for the booklet here reviewed.

[1] W. C. ALDEN: Glaciers of Glacier National Park. F. E. MATTHES: Mount Rainier and its Glaciers. Government Printing Office, Washington. Each 48 pp.

The glaciers of Mount Rainier, the largest in the United States, cover forty-five square miles, including ice streams four to six miles long. They are easily accessible and are of especial interest because they radiate out from this dormant volcano. Nisqually Glacier is representative. It is nearly five miles long, terminates about 4,000 feet above sea level, moves forward at the rate of about a foot and a third a day, and its terminus has retreated about 1,000 feet since 1885. Emmons, or White Glacier, is slightly larger. Mr. Matthes describes each of the ice tongues, discusses the distribution of snowfall on Mount Rainier, where the snow-line lies at about 7,000 feet, and makes it clear that the hollow occupied by Crater Lake and several similar depressions are not volcanic craters but ice-sculptured cirques. LAWRENCE MARTIN.

Destruction of Forests by Sand Dunes. Dr. H. D. House of the State Museum of New York, Albany, says, in a recent paper,[1] that in few places is the destruction of forests by sand more impressive than among the dunes of Coos Bay in southwestern Oregon. Approaching the entrance to Coos Bay he saw, to the south, a series of bold headlands covered by forests of fir and spruce and, to the north, miles of rolling sand dunes stretching inland like a desert with patches of willow and beech plants here and there and, in the distance, clumps of trees and even large areas of forests making a last stand against the encroaching dunes. The destruction of the forests here by shifting sands is all the more remarkable when it is remembered that this is a region of excessive humidity. Dr. House estimated that, in August and September, less than one-fifth of the time was dry enough, with the wind in the right direction and strong enough to produce any visible movement of the sand particles. When the wind is strong from the west, however, on a dry day, the sand movement is tremendous. It covers a six-inch log in the lee of a dune in less than an hour. Curious etchings are produced on sticks and timbers exposed to this blast. All parts of the wood except the knots are eventually worn away. The forests consist mainly of Douglas fir, Sitka spruce, Port Orford cedar, and western red cedar. Within the dune area the forests exist now only in patches, almost always in depressions, indicating the former level of the ground before the invasion of the dunes. The advancing crests of the dunes often open up small hollows, exposing the skeletons of a past forest. Where these hollows are of large size there soon comes into existence a green, grassy meadow, which is the home of numerous moist, sand-loving plants. In one of his illustrations Dr. House shows the great height to which the dunes attain and the "ravine-like" hollows in which the forests made their last stand. The trees in the photograph are being gradually overwhelmed by the dune which barely shows in the foreground.

CENTRAL AMERICA AND WEST INDIES

Panama Canal Traffic. In the first two months after the opening of the Canal (Aug. 15-Oct. 14) the commercial vessels passing through it carried 583,949 tons of cargo. The heaviest traffic was between the Atlantic and Pacific coasts of the United States, chiefly from New York and secondarily from Boston, Philadelphia and New Orleans, carrying merchandise to the principal California and Puget Sound ports or Honolulu. Vessels on the east-bound voyage carried chiefly canned fruits, vegetables and salmon, lumber, grain, sugar, pineapples and wine. Twenty-four vessels passed east bound and twenty-five vessels west bound. Ten vessels from the eastern United States and Canada went through from the Atlantic to the Pacific in ballast to return with grain. Eight vessels passed into the Pacific from Philadelphia, New York and the Gulf of Mexico with refined petroleum and other petroleum products, aggregating 51,501 tons, for China and Japan.

A large slide on the east bank of Culebra Cut, directly north of Gold Hill, on October 13-15 carried about 725,000 cubic yards of earth and rock into the

[1] The Sand Dunes of Coos Bay, Oregon. By H. D. House. *The Plant World*, Vol. 17, 1914, No. 8, pp. 238-243.

canal prism and blocked the channel for 1,000 feet to the passage of vessels larger than tow boats. This occurred two months to a day after the official opening of the canal to commercial traffic. The channel was cleared sufficiently, by Oct. 21, to permit the passage of vessels through the canal.

Earthquake in Jamaica. On Oct. 14 an earthquake was felt all over Jamaica. It was strong enough to awaken the inhabitants, but did no damage to buildings.

AFRICA

Rapid Development of Morocco. Since the French occupation of a part of Morocco there has been an extraordinary increase of European immigration and large development of foreign trade. When the Protectorate was declared in 1911 there were in the region now occupied by France only about 3,000 Europeans, chiefly at Casablanca and Rabat. Fifteen months later, in July, 1913, there were 50,000 European settlers in this region, of whom 38,000 lived in the coast towns (20,600 at Casablanca) and the remainder in the country districts and interior towns where formerly there were almost no Europeans. More than half of them are French. Most of these immigrants are laborers and artisans, with a sprinkling of small shopkeepers and business men. Nearly 300, however, acquired about 200,000 acres of farm land along the Atlantic coast, the Algerian frontier and near Mequinez and Marrakesh. They are growing wheat, barley, maize and market vegetables. Cattle, grapes, olives and cotton promise to be very successful. The large amount of fertile land and the splendid climate should rapidly develop the farming interests of Morocco, which is destined far to surpass Algeria in this respect.

The extraordinary increase in foreign trade is shown by these figures: Total exports and imports, exclusive of supplies for the troops, amounted in 1908 to $20,221,420; in 1910, $22,126,942; in 1911, largely owing to the French intervention, $31,849,368; and in 1912, after the establishment of the Protectorate, $40,567,538. During all these years imports have exceeded exports. (Condensed from "The Development of Morocco" by Percival Dodge, *Journ. of Race Develop.*, Vol. 5, 1914, No. 2, pp. 125-132.)

The Tanganyika Railroad. The railroad, about 800 miles in length, connecting Daressalam on the Indian Ocean with Lake Tanganyika, almost immediately after its completion, began to be very important as a commerce carrier. From June 1 to December 31, 1913, it carried 71,000 passengers, an average of over 10,000 a month. They included 1,857 first-class passengers, 4,063 second class and 59,400 third class, of whom 5,750 were native laborers in the service of the whites. The receipts from this passenger traffic amounted to 205,000 rupees. The freight carried swelled the total receipts to 920,000 rupees. In these seven months 2,856 trains were run. (*Journ. Afric. Soc.*, Vol. 14, 1914, Oct., p. 43.)

The Depopulation of Zanzibar. In eighty years Zanzibar will be depopulated if the birth and death rate continue the same as in 1910-1912. The statistics for the island in those three years are:

	1910.	*1911.*	*1912.*
Births	2,169	2,346	2,927
Deaths	4,611	4,885	5,191

Thus the birth rate is half the death rate. The birth rate was 13.8 per 1,000 inhabitants in 1909-12, while that of Ceylon was 35 to 1,000, and England, 23.8 to 1,000. The population of Zanzibar and Pemba is now 200,000, of whom 20,000 are Indians and 7,000 Arabs, nearly all the others being of the African black races.

Tin Resources in Africa. The discoveries within the past few years show that Africa is to become one of the important sources of tin. The total quantity of tin ore produced in the Union of South Africa in 1912 was 3,003

tons, of which the Transvaal contributed 2,618 and Swaziland 385 tons. In the report of the geological survey of Southern Rhodesia in 1911 it is said that the large low-grade bodies of tin ore will prove profitable to work. The principal tin fields of West Africa, in the western part of the Bauchi Province, are now being worked by white men and yielded, in 1912, 2,803 tons, valued at $1,881,650. (*Bull. Imperial Inst.*, Vol. 12, 1914, No. 3, pp. 452-458.)

ASIA

Dutch Scientific Research in the Malay Archipelago. A movement has begun in the Netherlands for a resumption of scientific exploration in the Dutch East Indies between Celebes and New Guinea, particularly in Ceram. Late last year the matter was referred by the president of the Royal Netherlands Geographical Society to the expedition committee, which reported to the council in March, 1914. The committee, from a study of all existing information, drew up a statement on the present state of our knowledge of the part of the archipelago between Celebes and New Guinea, which offers an important field for further research. This statement, together with the report of the committee, is published in the May number of the *Tijdschrift* of the Netherlands Geographical Society. As regards the large island of Ceram, it is pointed out that existing knowledge of its topography is scanty, and, for the interior of the eastern part, practically nil. From a geological point of view much valuable information would result from a study of the double bridge of islands between Celebes and New Guinea—the more northerly running through Pulo Peling, the Banggai Archipelago, the Sulu Islands, the Pulo Obi and Misol, to the so-called "duck-bill" of New Guinea; the more southerly through Buru and Ceram to Fakfak. This is, in fact, one of the most important and interesting tasks remaining to be done in the archipelago. A detailed examination of the geology of Ceram, known to us only through the work of Martin and Verbeek, would be of both scientific and practical value. In the domain of hydrography and oceanography there is much to be learned in the region round Ceram, and the programme would include surveys, soundings, studies of the tides, currents, temperature and composition of the water, and the fauna and flora of the coast, the coastal waters, and the deep sea. Little is also known of the inhabitants of the interior of Ceram, their relationships among themselves and with the coast peoples, their languages, and so on. The zoology and botany of the island offer a wide field for research, and, in conjunction with the geology, should throw an important light on the past history of this part of the world. The flora of central Ceram is considered to be probably the oldest member of the flora of the Moluccas. The proposed investigations promise results of great scientific interest. (*Geogr. Journ.*, Vol. 44, 1914, No. 4, pp. 407-408.)

AUSTRALASIA AND OCEANIA

Cattle in Queensland. According to *Dalgety's Review*, Queensland heads the list of Commonwealth states both for the number of its cattle (now over 5,250,000) and for its exports of beef (3,232,890 lbs. last year). The state realizes its opportunity in the ever increasing demand for meat, and is multiplying its cattle so that its store can be drawn upon for the world's markets. Country now unoccupied is to be used for ranching, and efforts are being made to maintain a high standard of quality among the animals. Statistics show that Queensland has the largest acreage of land per head of any cattle-growing country, and it is believed that, with careful management and closer supervision, the stock on many of the stations could be very largely increased. (*United Empire*, Sept., 1914, p. 745.)

EUROPE

Earthquake in Greece. On October 17, the whole of Greece was shaken by violent earthquake shocks, the first of which lasted twenty seconds. The center was apparently near Thebes, where a number of houses fell, espe-

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cially in the villages of Cappareni and Pirri, which was partially destroyed. Atalante and Chalcis were also seriously injured, and all the railroad stations on the Larissa line were damaged. The shocks were also felt in the Peloponnesus, the Cyclades, Eubœa, and the Ionian Islands. Several houses at Athens and the Piræus were cracked, but none of the ancient monuments suffered. A few persons were injured, but, so far as known, no lives were lost. Though much less severe than the earthquakes of April 20 and 27, 1894, the recent shock seems to have originated in the same region, and probably in the same great fault. This fault was traced by M. Papavasiliou for thirty-three miles, passing through Atalante, in a direction parallel to the adjacent Gulf of Eubœa. The throw was generally small, though in places it amounted to as much as four or five feet.

POLAR

Antarctic

Shackleton's Antarctic Expedition. Sir Ernest Shackleton left Buenos Aires for South Georgia on October 27 to carry on his trans-Antarctic enterprise. In a message to the *Daily Chronicle* of October 29 he announced some changes in his plans. Instead of the *Endurance* returning to South Georgia and Buenos Aires, after landing the members of the expedition, as was originally intended, she will winter in the Antarctic. Sir Ernest said that, on arrival at South Georgia, all the dogs will be landed on one of the small islands of the group and left ashore. The geologists will also remain at South Georgia. The *Endurance* will then go south to examine the pack-ice and see whether it is loose enough to go into without unnecessary delay. The *Endurance* will then return to South Georgia to pick up the members of the expedition and the dogs. She will be coaled to her fullest capacity, and, proceeding south again, will push right into the pack, keeping as much eastward as possible, in the hope of meeting more open water than is likely to be found further west. Sir Ernest hopes to winter the vessel in 77°30′ S. latitude, and if this point is gained at a sufficiently early date the transcontinental journey may be started this season. Should the ice conditions be too unfavorable, the journey will not be begun until October of 1915. The Argentine Government has provided the expedition with a wireless receiver, with which it will be possible to receive communications and time signals while the expedition is in the Antarctic. (*Nature,* Vol. 94, 1914, Nov. 5, p. 260.)

Scientific Results of Shackleton's First Expedition. The London *Times* (Literary Supplement, Oct. 16, 1914) says that the first volumes of results of the geological researches of the British Antarctic Expedition under Shackleton, 1907-09, will soon be published by Mr. Heinemann with contributions by Prof. Skeats of the University of Melbourne, Sir Douglas Mawson, Drs. H. J. Jensen and Allan Thomson, Professor Woolnough, Mr. C. Hadley of the Australian Museum, Mr. Frederick Chapman of the National Museum, Melbourne, Mr. James Murray, and others. The second and completing volume will follow a few months later. Sir Douglas Mawson's account of the Australian Antarctic Expedition of 1911-13 is expected from the same publisher early next year.

Arctic

Crocker Land Not Found. The Museum of Natural History received information, on November 23, from Mr. W. Elmer Ekblaw, geologist and biologist of the Crocker Land Expedition, that Crocker Land had been searched for but not found. In 1906, Peary saw from an elevation of 1,400 feet, on Cape Thomas Hubbard, what appeared to him to be a land rising out of the sea in the north-west to mountainous heights. He named it Crocker Land and placed it on his map about 130 miles north-west of his point of observation on the northern point of Axel Heiberg Island.

Ekblaw's letter, dated Aug. 29, 1914, said that Donald B. MacMillan, leader of the expedition, accompanied by Ensign Fitzhugh Green, engineer

and physicist, set out across the ice of the Polar Sea in search of Crocker Land. The date of starting is not given, but it was apparently about the middle of March. They sledged over the ice 125 miles north-west from Cape Thomas Hubbard. During two days of the journey they saw what they thought was land, but it finally turned out to be mirage. Having arrived nearly at the place where Peary put Crocker Land on his map, they concluded that either the land does not exist or it is not in the area to which their route was directed.

They were two months on the journey from Cape Thomas Hubbard and back again. Traveling on the sea ice was very difficult and perilous. They lost most of their dogs, crossed thirty-eight leads on thin ice, and the day after they returned to Cape Thomas Hubbard, in the middle of May, "the ice on the Polar Sea broke up and became a hideous, grinding chaos of broken ice on which they would certainly have perished had they not got back as they did."

Ekblaw wrote his letter on Knud Rasmussen's motor boat near Cape Alexander, on the Greenland coast only fifteen miles south of Etah, the headquarters of the MacMillan expedition on the east shore of Smith Sound. Rasmussen, who had brought supplies and mail for the MacMillan party, had been unable to get further north to Etah. Ekblaw and three Eskimos had left headquarters in order to kill walrus for their winter supply; thus they met Rasmussen. Tanquary and Ekblaw had spent the summer at Umanak, North Star Bay, studying the geology and biology of the region there.

"Apparently there is no hope to get any of our mail back [to the United States] until winter sledging begins. Then we shall be able to get our mail through as we did last year from Upernivik [by catching the first Danish steamer going to Copenhagen]. Let all our friends know that we are well and contented, that for another year at least we have plenty of everything we need to keep the wolf from the door of our igloo. Tell our friends that, though we think of them often, our work is not yet done and until it is we shall not be homesick. Also commend K. Rasmussen for his unswerving, continued and exquisite courtesy towards our expedition. I think some public mention should be made of it."

Ekblaw reports MacMillan as saying that the party must get back home next year. The ice conditions, all along the coasts, were very bad last season. Ekblaw had recovered from a frost-bitten foot. They have planned a strenuous year's work for 1915. "Everything thus far has been eminently successful, both exploration and scientific work."

While these details are fragmentary, doubtless, on account of the speedy departure of Rasmussen's boat, they indicate that much work has already been done, and geographers will await with great interest the scientific data which, it is to be hoped, included soundings by Mr. MacMillan and Ensign Green in the hitherto unknown waters west of Axel Heiberg Island. The indications are that studies in all scientific lines contemplated have been carried on; and from a party so well equipped for scientific work it is to be expected that results worth while will be obtained.

Russian Arctic Expeditions. The death of Captain G. J. Sedoff, on or near the north coast of Franz Josef Land, while attempting to reach the North Pole, and the retreat to Russia of his expedition, were recorded in the *Bulletin* for December (p. 928). *Petermanns Mitteilungen* for October reports an even more tragical ending of another Russian Polar party.

This expedition, which set out in 1912, on the *Saint Anna* under the direction of Lieut. Brussiloff, proposed to cross the Kara and Siberian Seas eastward to Bering Strait and thus repeat, for the first time, Nordenskjöld's voyage on the *Vega* in 1878-79. When Sedoff's ship, the *Saint Phoka,* turned southward among the islands of Franz Josef Land she found two members of the Brussiloff expedition, mate Albanoff and seaman Konrad, at Cape Flora, on the south coast of that archipelago, and brought them home. These men reported that the *Saint Anna* was caught in the ice of the Kara Sea in 71° N., in August, 1912, while on her way to the Yalmal Peninsula. She drifted for a

year and a half till she reached Franz Josef Land. In 83° N. and 60° E., north of Crown Prince Rudolf Land, mate Albanoff, with thirteen sailors, left the ship on April 23, 1914. After covering twenty-six miles, three of the sailors returned to the ship. The others did not reach Alexandria Land, the most westerly island of the Franz Josef Land Archipelago, till July 22. From here a part of the crew undertook to walk over the islands eastward; the others started out in two boats for Cape Flora, where only two men, however, arrived. The efforts of the *Saint Phoka* to find the missing men as well as the *Saint Anna* were without avail. No mention is made in the report of any geographical results.

The vessels *Hertha* and *Eclipse* were sent out to succor these two expeditions. The *Hertha* returned to Alexandrovsk on Sept. 19. In Franz Josef Land she found records concerning the fate of the Sedoff expedition. No traces were found of Brussiloff and his men. The *Hertha* then returned home.

Rasmussen's Next Expedition to North Greenland. *Petermanns Mitteilungen* reports (October, 1914, p. 200) that, in 1915, Knud Rasmussen, the Greenland explorer, will make another journey to North Greenland with facilities for more extended work than he could carry out in his expedition of 1913. He will be accompanied by investigators in the fields of geology, zoology and meteorology. The detailed results of his journey of 1913 have not yet been published.

METHODOLOGY AND TEACHING

Physiography and Anthropogeography. Professor Walter S. Tower, of the University of Chicago, writing in the *Journal of Geography* (Vol. 12, 1913-14, No. 10, pp. 345-349), says that field work in geography is now largely made up of two sorts: (1) field trips with classes in physiography and (2) trips in connection with courses in economic and commercial geography. The field trips with classes in physiography have had as their main object the interpretation of land forms. Such field work has real value, as far as it goes, but, from the geographic standpoint, it is too narrow, since it stops short of the chief object of the science, the correlation of earth features and life responses to those features. Professor Tower illustrates the difference as follows:

"In a hilly region of moderate relief . . . a single stream and its valley might be the area chosen for a field trip. If the field work were physiographic, some of the things studied would be: (1) possible influences of bed rock on the location, trend or general development of the valley; (2) the angles of slope of the valley sides and the reasons for variations in these slopes; (3) causes for variations in the width of the valley; (4) relations of tributary valleys and streams to the main valley and its stream; and (5) evidences of the kinds of work then being done by the stream, with reasons for that work and the results of that work.

"If the same region were visited for . . . well-rounded geographic study, many of these same things might be noted. The real object, however, would be to carry the observations and explanations much farther, including, for example: (1) reasons for contrasts of natural vegetation between the hill slopes and the flood plain; (2) the effects of topography and soil on man's use of the land; (3) the relations of the valley to the locations of dwellings and routes of travel; (4) effects of the character of the stream on its uses; (5) influences of the valley or stream on local activities other than the use of the land and the stream itself; and (6) evidences of climatic influences affecting the life of the region.

"As a rule, wherever a limited area is worth visiting for purely physiographic study, it is worth fully as much, if not more, for geographic study. Furthermore, many areas, offering little in physiographic features, offer much for geographic analysis; . . *all* the associated things are linked, as far as possible, in the relationship of cause and effect. . . . Geography needs field work, but field work which is truly geographic."

PERSONAL

Prof. Dr. Guido Cora of Rome, one of the distinguished geographers of Italy and the publisher and editor of *Cosmos*, spent a few days in New York and Washington late in November. He was completing a journey around the world, in the course of which he attended the meeting of the British Association in Australia and visited the interior of Queensland, the Great Barrier Reef and the capitals of most of the states. Some of the geographical and other scientific societies of the Commonwealth improved the occasion of his visit to confer their honors upon him.

OBITUARY

HENRY GANNETT. In the death of Henry Gannett, LL.D., the country has lost one of its leading geographers. Dr. Gannett died at his home in Washington, on Nov. 5, at the age of 68. He had served the Federal government for forty-two years, beginning in 1872 as topographer on the Hayden Survey. He had been a geographer of the U. S. Geological Survey since 1882 and, for some years, its Chief Geographer. He was Geographer of the Tenth, Eleventh and Twelfth United States Censuses and edited their three statistical atlases which have been most helpful to geographers and statisticians. He was chairman of the U. S. Geographic Board. He was a charter member of the National Geographic Society, its president in recent years and chairman of the Society's research committee. For many years and until his death Dr. Gannett was a Corresponding Member and one of the Associate Editors of the *Bulletin* of the American Geographical Society; and his occasional collaboration in the Society's work has always been greatly appreciated.

Dr. Gannett was also a member of a number of societies of geographers, geologists, economists and statisticians at home and abroad, vice-president, at one time, of the Association of American Geographers, vice-president of the Washington Academy of Sciences and secretary of the Eighth International Geographical Congress.

At the time of his death Dr. Gannett was working with the keen interest of the well-trained geographer on the translation of a previously unknown account of the journey of one of the early Spanish explorers in the arid southwest.

Dr. Gannett was forceful but modest and lovable. He endeared himself to those who had the privilege of knowing him well. His loss will be felt not only by his friends, but also by the many who have made use of his solid contributions to American geography. In cartographic, statistical and applied geography he was one of our chief authorities.

Among Dr. Gannett's works were: "Dictionary of Altitudes" (four editions); "Origin of Certain Place Names" (two editions); "Boundaries of the United States"; "Areas of the United States"; "Profiles of Rivers in the United States"; "Magnetic Declination in the United States." He also wrote reports on the forests of several states, contributed to the reports of the Conservation Committee, and had charge of the preparation of the geographical dictionaries or gazetteers of twelve states. He was the responsible author of the best topographic map and the best rainfall map of the United States. Among his other works were: "United States" (1878) in Stanford's Compendium; "Commercial Geography," (1905); "Physiographic Types" (1898 and 1900), issued by the U. S. Geological Survey, and "Topographic Maps of the United States Showing Physiographic Types" (1907). In his "Lake Chelan," in 1908, he made one of the first clear statements of the hanging valley as an evidence of glacial sculpture; his papers on "The Unaweep Cañon" (1892), "The Timber Line" (1899) and "Geography and Glaciation in Alaska" (1899) are also to be mentioned. He published "A Manual of Topographic Methods" (1893 and 1906). He was connected with the Philippine Census of 1902 and the Cuban Census of 1907-08.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

History of Saskatchewan and the Old North West. By Norman F. Black. xxiv and 605 pp. Ills., index. Carswell Co., Ltd., Toronto, 1913. $6. 11 x 8½.

A detailed account of the progress of the old Canadian Northwest—chiefly historical but with much geographic material in the chapters on Colonization, Immigration, Life and Customs, Settlement and Exploration. One could wish for a better system of references. Many otherwise valuable data cannot be used for scientific purposes because of the too frequent omission of authorities. Nevertheless the spirit of the book is excellent and the story is rarely tedious. For serious purposes a location map is indispensable. But in this respect it is like most local histories. However, no other book contains such a wealth of information about Saskatchewan, and that part of it dealing with the later period is really excellent. ISAIAH BOWMAN.

The Tourist's California. By Ruth K. Wood. 395 pp. Map, ills., index. Dodd, Mead & Co., New York, 1914. $1.25. 7½ x 5.

Starting with an account of the various routes and modes of transportation to California, the author next takes up money, languages and names, climate and seasons, hotels, restaurants, theatres, and sports of California. The counties and tourist cities of the State are considered in detail, the places of interest being described, and complete directions are given as to routes, hotels, guides, expenses, etc. To many desiring to earn their living in California the account of the poultry industry of Petaluma, Sonoma County, will be of interest. Here the profit on each hen averages a dollar a year; and in spite of the fact that, each year, the hens of Petaluma lay more than 12,000,000 dozen eggs, the demand in California alone is not supplied. There are numerous photographs and a map of California. To all interested in the State, whether for pleasure, health, or profit, the book is to be recommended.

WILBUR GREELEY BURROUGHS.

The Catskill Water Supply of New York City. History, location, sub-surface investigations and construction. By Lazarus White. xxxii and 755 pp. Ills., index. J. Wiley & Sons, New York, 1913. $6. 9 x 6½.

A record of the construction of a great water-supply system, involving problems of diverse and difficult nature, if written, as this book is, by competent authority, is of value to many students of engineering. The larger part of the book, devoted to methods of construction, the technique of organization and numerous engineering details, will interest only those who are versed in engineering science; but two or three points will interest readers of the *Bulletin* and may very properly be discussed in its pages.

The introductory chapter narrates the stages of growth of the water system from the individual well to the present magnificent plant. Between 1613 and 1774, the inhabitants depended entirely on springs and wells. The first recognition of water as a community problem came about 1658, when a public well was opened near Bowling Green. This was followed by others; but during the early years of the eighteenth century the growing population began to be distressed by the contamination of the well-water and sought to cart water from beyond the confines of the village. The 30,000 people at the beginning of the

Revolution began to look upon the water supply as a public service. The first system conducted water from a fresh-water pond to a reservoir at Broadway and White Street. Again in 1800 (population about 60,000), a contaminated water supply, due to over-crowding, led to the construction of a new system by a private concern which conducted water through hollow logs and supplied 1,400 houses. In 1833, the first public water works used as the source of supply a well at Thirteenth Street and Broadway, but the water deteriorated quickly. Coincident with this the Croton project was being advocated. The incentive came largely from the success of Philadelphia in securing an ample supply of water and thereby stamping out the yellow-fever scourge from which cities were suffering. Finally, after much opposition, the first Croton Dam was constructed about 1840 and was in service fifty years.

The city, however, demanded auxiliary reservoirs during these years, and a number were added, as the Central Park Reservoir, 1857-1862, and the High Bridge Reservoir in 1869. At intervals, the city suffered from shortage of water, and the new Croton aqueduct was constructed and ready for use in 1890. But within nine years the city was again facing the approach of a short water-supply. The Catskill water-supply system was probably hastened by the organization of the Ramapo Water Company, which attempted, at an enormous cost, to contract with the City of New York to supplement by a private system the Croton supply. Certain city officials and associations, however, were able to show the folly of such a contract. A commission on additional water supply was finally appointed in 1903 and in 1905 the project was assured. In this project a yield of 660,000,000 gallons of water daily is estimated, drawing water from numerous watersheds, chiefly the Esopus, Rondout, Schoharie and Catskill.

Although the descriptions are largely technical, a lay reader will find many items of interest in the pages devoted to construction; and as photographs, maps and drawings in profusion illustrate the text, they will aid the reader in understanding the main points of the problem. Among these it is likely that the Hudson siphon will find first place. This problem offered four plausible methods: a bridge carrying steel pipes, pipes laid in trenches in the river, shield tunnels below the river bed, or a tunnel deep in solid rock. The tunnel was found decidedly the cheapest and was of course more durable; and the site for this was located near Storm King. The difficulties and interesting features of such a work are detailed. Secondary problems of general interest are found in the accounts of pre-glacial channels, in the processes of ventilating the tunnels during the progress of the work and in the aëration of the water. The book is a contemporaneous record of a great undertaking.

ROBERT M. BROWN.

Indian Days of the Long Ago. By Edward S. Curtis. x and 221 pp. Ills. World Book Co., Yonkers-on-Hudson, New York, 1914. 8½ x 5½.

In story form, the author gives an intimate view of the Indian before the coming of the White Man. The life, habits, customs, religion and folk-tales of the Indian are told simply and entertainingly. The influence of the religious superstitions of the people upon the character of the young is brought out clearly in the account of the mountain vigil and fasting of the little Indian boy Kukusim. Numerous pictures illustrate the text. The book should appeal especially to children.

WILBUR GREELEY BURROUGHS.

A History of Emigration from the United Kingdom to North America. By Stanley C. Johnson. (Thesis . . . Univ. of London.) 387 pp. Index. School of Economics, London, 1913. 6s. 8½ x 6.

In fourteen chapters full of interesting facts the history of emigration from the United Kingdom to North America is discussed in all its phases. Of the 12,000,000 emigrants into North America since 1815, three-fourths went to the United States and only one-fourth to Canada. "Not only has emigration been prompted by a series of agricultural depressions but also . . . from industrial disturbances" (p. 53). On page 61 one reads that "agricultural and industrial conditions are but little concerned with the exodus of the better class

emigrants.'' The author shows that this class is encouraged through the medium of advertising to try new fields, whereas the mass that finds the competition in the cities too keen leave in the hope of alleviating their troubles. The book closes with arguments in favor of colonial expansion as a means of strengthening imperial safety and power. An appendix of statistical tables and a bibliography complete this well-worth-while treatise.

EUGENE VAN CLEEF.

The United States and Mexico, 1821–1845. By G. L. Rives. Vol. I. ix and 720 pp. Maps. Vol. II. vii and 726 pp. Maps, index. Charles Scribner's Sons, New York, 1913. $8.00. 9 x 6½.

A mass of facts woven into the concluding history of the territorial expansion of the United States. The period of less than three decades marks the beginnings of our international relations with our nearest Latin-American neighbor. The factor of distance, at a time when telegraphic communication was wanting, is shown greatly to have affected intercourse with Mexico and points on the California coast. The author is free from partisanship and writes with appreciation of the actors and sympathetic understanding of Latin-American ideals.

LEON DOMINIAN.

CENTRAL AMERICA AND WEST INDIES

Encyclopædie van Nederlandsch West-Indië. Onder redactie van H. D. Benjamins en J. F. Snelleman. Afl. 1-3, pp. 1-192. M. Nijhoff, The Hague, 1914. 10½ x 7½.

The work will include 12-15 fascicles of 64 pages each, of which three have already appeared. It is to present the results of the latest research directed upon all the activities of the Dutch West Indies. History, geography and agronomics are recorded with an excellent apportionment of relative values. These three fascicles complete the letters A and B and carry us through eight pages of the article ''Cacao.'' In the article ''Aardkunde'' are twelve pages given to the geology of Surinam and an equal number to the Dutch Antilles—very complete in presentation and with such abundant citation of the bibliography as to make the article invaluable to the student of their geography. The ethnologist will find himself well satisfied with sixteen pages on Benedenlandsche Indianen, seven on Bovenlandsche Indianen and thirteen on Boschnegers. Progressing to more intimate detail we note an article on Aard-Eten, which is by far the best brief presentation of geophagy (the practice of eating earth) which we now recall; another excellent study is ''Afgoderijdans,'' a careful presentation of the dance of the negroes in the islands and a collation of the African material in order to establish the source and the religious element of this dance. The extent of the geographical information is well illustrated by the article on the small island of Aruba. Two and a half pages are devoted to the geology of the island and three pages to the history and economics of the place, against a dozen lines in our newest American encyclopedia. The completion of this fine work will be awaited with interest, for the present fascicles give good promise of richness.

WILLIAM CHURCHILL.

Colbert's West India Policy. By Stewart L. Mims. 385 pp. Index. Yale University Press, New Haven, 1912. $2. 8½ x 6.

The events narrated in this volume are of the utmost importance as underlying the growth of French rule in the Caribbean until the eventual success of the British, in the Napoleonic contest, destroyed that empire. This was not without far-reaching effect upon the United States as a commercial power in American waters. Therefore we cannot have too much information which may make the situation of the West Indies clear to our comprehension. Professor Mims has been indefatigable in turning up fresh documents bearing upon the formation of the French company of the West Indies. His research in the wholly uncatalogued treasures of the Archives Nationales has added a wealth of altogether unpublished data, even though it was not his fortune to chance upon so brilliant a discovery as the recovery by Cultru of the manuscript of the

voyages to Senegal and the West Indies of the Sieur de la Courbe which at once proved the reckless inveracity of Labat. This discovery seems not to fall within the acquaintance of Professor Mims, although he does speak of the unreliability of Labat and spells the name wrong in the index. The theme of this work is of the utmost interest, yet the volume is far from interesting. This is wholly due to the lack of narrative skill on the part of the author, for writing is quite as much a trade as being a professor, and the unskilled hand fails to bring out the sweep of events in such a way as to present a striking picture. There is a statement in not more than two lines setting forth the fact that Morgan intervened in French affairs and died. Pirate, buccaneer, knight by the grace of the British crown, Sir Henry Morgan must be far more than two lines within any West Indian picture. WILLIAM CHURCHILL.

Panama and the Canal. The story of its achievement, its problems and its prospects. By Willis J. Abbott. x and 468 pp. Ills., index. Dodd, Mead & Co., New York, 1914. $2. 8 x 5½.

A breezy, reportorial story of the Panama Canal Zone tour, *via* Jamaica. It includes an account of the acquisition of the Canal Zone by the United States.

SOUTH AMERICA

The Upper Reaches of the Amazon. By Joseph F. Woodroffe. xvi and 304 pp. Ill. Methuen & Co., Ltd., London, 1914.

There are many books about the Amazon basin, and most of them have something about its upper reaches; but, as a rule, the authors have seen the country from the comfortable deck of a steamer or from an uncomfortable seat in a canoe headed downstream for the nearest port at which a steamer can be taken. Mr. Woodroffe's book is not of this kind; indeed it is unlike any other book that has thus far appeared on any part of South America.

There is little or no geography in it in so far as geography is a matter of maps, of latitude and longitude, but the physical descriptions are good and clear wherever they are attempted. The valuable part of the book lies in his exposition, from an intimate personal acquaintance with them for eight years, of the social and moral condition of the people, and especially of the native races, and their exploitation by commercial companies and by individuals.

The author went to Iquitos, Peru, in 1905 in the employ of a mercantile firm. Two months later he was sent up the Rio Javary in charge of a trading expedition, and made his first acquaintance with the life of the region. Five months after his arrival the firm failed, and the author, entirely without money or friends, was left to his own devices. As he could find nothing better to do, he went to work as a common laborer on a small river steamer running up the Ucayali. On his return to Iquitos he took charge of a squad of rubber cutters and was sent up the Rio Tamaya, where he had painful but enlightening experiences. Returning to Iquitos he entered into partnership with a merchant and made Nauta his headquarters. In time he became an employer of labor and later, leaving his store in charge of a manager, he took fifty-eight men and fourteen women and went up the Rio Tigre to cut rubber, traveling for six weeks to reach the forests. Here he remained for nine months, after which he returned to Nauta with his rubber. He found that his manager had run away and the market price of rubber was so low that he was unable to meet his liabilities. Going to Manaos he was employed to take charge of rubber forests near the Rio Javary, and, after remaining there for five months, he left on account of ill health. Engaging with an English firm, he was sent to Encanto on the Putumayo, where he lived for five months, and became familiar with the business of the region and with the condition of the Indians. Early in 1911 he was transferred to Chorrera, where he spent several months, leaving there in September of that year, and reaching Manaos in October, after being shipwrecked and losing all his baggage.

In the employ of the Madeira and Mamoré railway contractors he then went to the Madeira region and remained there until August, 1912. Shortly thereafter he left the railway, engaged with a Bolivian trader and returned to the

rubber forests. He ascended the Beni to Riberalta in Bolivia, where he remained until June, 1913, when he returned to England.

The book contains but one very general, small-scale map of the region, and in this respect is not what it should be. Several of the streams and many villages and settlements the author visited or mentions are not shown at all, nor are they to be found on other published maps.

Though well written in the main, the book lacks critical editing: there are errors in the Portuguese words and many absences or shiftings of accents. A few statements regarding the vegetation ought not to be in a book otherwise so valuable. For example, palm trees are mentioned as ferns (pp. 288, 293). At p. 51 he calls *Attalea speciosa* a tree fern; it is a well-known palm. At p. 115 he says the Panama hats are made of "grass or palm shoots," whereas they are made from the leaves of a screw-pine or *Pandanus*. The Gitiranabóia, erroneously called by the author "jaquirana boa" (p. 247), supposed to be deadly, is the lantern fly, a hemipter and perfectly harmless in spite of its looks. Its nature is pointed out in the *American Naturalist*, Vol. XIX, pp. 835-838, Sept., 1885. These are small matters, however, in comparison with the public service the author has done in setting forth his own observations and experiences in connection with the scandals that have lately been aired in England in regard to the treatment of the native races employed in gathering rubber in Peru, Ecuador, and Bolivia. Probably no English-speaking person has ever had such personal experience or obtained such an intimate acquaintance with the rubber forests of the Amazon and with the social and commercial system under which the industry has hitherto been carried on. Until lately those dark forests have kept their own secrets; no such living document has ever come out of them before. JOHN CASPER BRANNER.

AFRICA

Essai sur l'amélioration du régime du fleuve Congo par la régularisation du débit des lacs et anciens lacs congolais. By Robert Thys. 54 pp. Maps, ills. Compagnie du Congo pour le Commerce et l'Industrie. [Brussels], 1913 (?) 12½ x 10.

With the colonization of the Congo Basin, it becomes necessary to inaugurate plans for the regulation of the great river. This essay tries to show how, within a few years and for a few million francs, it will be possible to retain by dams at the lakes and ancient basins some 67 thousand-millions cubic meters of water during the rainy season to be released during the dry. With one or two minor changes the author proposes thereby to create a constantly navigable channel between Kiambi and Ankoro, to render usable eventually the stretch of rapids between Kasongo and Kindu, to give a depth sufficient for passage to the reach between Kindu and Ponthierville and to obtain a foot or two additional depth over the shoals at Fetish Rock. In addition this will reduce notably the extent of the inundated territory during the rainy season, yielding thereby millions of hectares to the domain of the colony, and at the same time contributing to the healthfulness of the country. Like many waterway advocates, he counts all this as gain in power and figures out 4,700,000 horse power for the mining regions of Katanga and Urua.

The entire essay is very carefully compiled and is illustrated with maps and photographs. In this it is exceptional. After a brief explanation of the different points where effective work could be done and of the determining causes, as rain and run-off, a yearly programme covering a period of six years is offered. The paper gives as concise and clear a picture of the Congo waterways as can be found and the reviewer highly recommends it.

ROBERT M. BROWN.

Tripolis. Von E. Banse. 158 pp. Map, ills. A. Duncker, Weimar, 1912. Mk. 3. 9 x 6.

The author has acquired no little experience of the Asiatic and African shores of the Mediterranean and the results appear in this sketchy work upon Tripoli. He now shows himself more familiar with the habit of life and man-

ner of thought under the Crescent. He writes with great sympathy for its culture, whether it be regarded as dwarfed or distorted. In several particulars he has made exhaustive research, but in general he has preferd to write an entertaining and very readable account of the city of the Syrtes and its immediate oasis life. His text is sprinkled with little line drawings of his own, scarcely more than diagrams, but they supply so much information that they will be found a most valuable addition to the work, for it is in these unpretentious sketches that the wealth of his information is recorded.

WILLIAM CHURCHILL.

A Historical Geography of the British Colonies. Vol. 4: South Africa. Part 1, History to 1895. By Sir Charles Lucas. New edit. 331 pp. Maps, index. Oxford Univ. Press, Amer. Branch, New York, 1913. 7½ x 5½.

This book is not intended as a rival to Theal's great history of the Cape, but it is an excellent narrative work. The author presents the facts in such manner as to avoid giving offence to any of the jangling elements which now are earnestly attempting to forge a new and wholesome nationality of Boer and Uitlander. Since the first edition the Union of South Africa has come into being; that has necessitated the recasting of the whole work, and the two volumes have been expanded to three. This first volume carries the history from the time of Bartholomew Diaz in 1487 to 1895 as marking the end of the Matabele war.

WILLIAM CHURCHILL.

Reminiscences of a South African Pioneer. By W. C. Scully. 1st Series—"Wanderjahre." 320 pp. Further Reminiscences, 384 pp. Ills., indexes. T. Fisher Unwin, London, 1913. 9 x 6 each.

Wholly unpretentious are these two volumes. They are filled with the chatty and personal reminiscences of a man who has done his duty in South Africa for nearly a half century. In 1868, when he first set eyes on Table Mountain, the Cape was one of the wild frontiers of civilization. In the first volume, Mr. Scully records the adventurous life of a youngster seeking a foothold, miner, storekeeper, hunter, all the varied employments of youth in a new country. The second volume takes up his better ordered life as a civil servant—the record from 1876 to the outbreak of the Boer war in 1899. A promised third volume will complete the narrative through the establishment of the Union of South Africa. We know of no work which tells so intimately and so entertainingly the story of this settlement of South Africa. From the author's narrative we obtain a good idea of the qualities which must characterize the pioneer at the edge of the wild. The author's record is entertaining and illustrates a long series of events, which would be hard to comprehend without some such illumination.

WILLIAM CHURCHILL.

The Book of the Lion. By Sir Alfred E. Pease. 293 pp. Ills., index. Charles Scribner's Sons, New York, 1914. 9 x 6.

At present the game reserves of the British East African Protectorate serve as a refuge for the lion, but certain settlers are urging his extermination, even within the protected areas. Concerning this policy, Mr. Pease writes: "I desire that what is here set down may encourage the British public to insist that one little corner of our vast empire shall remain a sanctuary for that royal creature which we have selected as the emblem of our own valour and magnanimity." The author says that the disappearance of multitudes of African game animals has resulted from hunting which caused the great herds to migrate to regions where food, water, climate and other factors were against them and their young; and as their numbers thus were diminished, they finally were exterminated by the pursuing hunters. Therefore, the author urges that the vast game preserve in British East Africa, since it is unsuited for colonization, should remain as a natural sanctuary to the lion and all other animals within its borders; else they soon will cease to exist. The reader will support Mr. Pease in his admiration of the lion after reading the author's account of

the lion's ways, the methods of hunting him, and the bravery shown by this beast against his human adversaries. The work is well illustrated.

WILBUR GREELEY BURROUGHS.

ASIA

With the Russians in Mongolia. By H. G. C. Perry-Ayscough and R. B. Otter-Barry. xxii and 344 pp. Map, ills., index. John Lane Co., New York, 1914. 9 x 6.

According to the authors, Russia does not want to be put to the expense of guarding her Chinese frontier. She is, therefore, trying to secure a dominating influence in Mongolia, in order to make that country a buffer state between herself and China. For commercial reasons, also, Russia realizes the importance of control over Mongolia, since that region possesses great natural resources, as yet almost entirely untouched. Mongolia, say the authors, "cries out for capital and enterprising men to undertake the development of the gold, silver, coal, and lead that abound in the northern valleys. To the commercial man, the miner, and the sportsman, Mongolia opens up a fine field in the near future."

These topics are discussed by the authors, who have traveled extensively in Mongolia, and know what they are writing about. They tell also of their personal experiences while exploring in Mongolia, the life and customs of the people, and other matters.

The account of the Russian institution of the "People's House," established in the larger towns of Russia and Siberia, is perhaps of practical value to ourselves. The "People's House" is supported by the Russian Government. It is a place where, on the payment of a small sum, one may enter, read the latest papers, partake of tea and non-alcoholic drinks, and hold social converse. In the evenings popular performances, concerts, etc., are given, also at low prices. The idea is not new, however, as an important number of our rural communities provide similar facilities. The book is illustrated with photographs and a large sketch map of Mongolia.

WILBUR GREELEY BURROUGHS.

Through Shên-kan. The Account of the Clark Expedition in North China, 1908-9. By Robert Sterling Clark and Arthur de C. Sowerby. Edited By Major C. H. Chepmell. 247 pp. Maps, ills.., index. T. Fisher Unwin, London, 1912. £1 5s. 10 x 8.

In the very heart of China the Hoang Ho makes a great bend to the north and to the deserts of inner Asia out beyond the great wall. Approximating the chord of this arc, Messrs. Clark and Sowerby conducted, in 1908 and 1909, the careful reconnaissance of which the record and the scientific results are presented in this volume. Their exploration—for the region was almost wholly unknown—extended from Tai-yüan fu to Lan-chou fu. At the later point their further approach to an unvisited border of Tibet was checked by the violence of savage mountaineers, who killed Hazrat Ali, an expert cartographer, who had been detailed to the expedition by the Indian Survey Department. It is to be regretted that the survey was not carried out according to the original plans, for the recent work of Sir Aurel Stein on the other side of Gobi has given a hint of what treasures the desert may disclose to careful search. It is only with reference to its original goal that the expedition may be called incomplete. The record of the territory traversed before the check is most complete, the narrative is clear and ever interesting, the route map is drawn with scrupulous care, the astronomical determinations of position are all that could be desired, and the zoölogical collections have all been monographed by competent specialists. Few expeditions of recent adventure have accomplished so much in so short a time, still fewer have presented the results in such satisfactory form.

WILLIAM CHURCHILL.

India, Malaysia, and the Philippines. A Practical Study in Missions. By W. F. Oldham. viii and 299 pp. Index. Methodist Book Concern, New York, 1914. $1. 8 x 5½.

These lectures on the Nathan Graves Foundation were delivered to the

undergraduates, men and women, of Syracuse University by an active worker in the mission field. The pages on Filipino independence are most interesting. The inability of the working classes to read and write and their long-inherited custom of one-man rule in clan and tribe make the great majority of the people unable to understand and not inclined to appreciate self-government by a majority. The "index" is rather a table of contents. DAVID H. BUEL.

Aus den Waldungen des fernen Ostens. Forstliche Reisen und Studien in Japan, Formosa, Korea und den angrenzenden Gebieten Ostasiens. Von Amerigo Hofmann. 225 pp. Maps, ills. W. Frick, Vienna, 1913. 9½ x 6½.

With no little skill as a narrator Dr. Hofmann presents a picture of the forestry of Japan, Formosa and Cho-sen, in which the scientific theme is happily engaged with the psychology of a forest-loving race. He makes it clear that forestry became a science in Japan when we were in the infancy of our culture, and that with all his experience in the state forests of Austria-Hungary there was little that he could teach to the foresters of the Tokyo Daigakku, in which he filled a professor's chair for eight years. His particular research was addressed to the study of the control of the mountain torrents, especially to the study of the regulation of the streams in their upper courses as brooks on the higher slopes. In this he was concerned with two topics. One deals with the wash of the torrents, the erosion damage which they can do in flood, and the control of that erosion before it results in denudation of the humus slopes. This topic interlaces with the control of the streams, so that they may be turned to economical advantage as a freight highway for the logging product. The author also interprets the Japanese landscape in its reaction upon the Japanese character.

Ancient India. From the earliest times to the first century A.D. By E. J. Rapson. 198 pp. Maps, ills., index. University Press. Cambridge, 1914. 7½ x 5.

Within the limits of a primer this distinguished authority has presented the outlines of the most obscure period of Hindu history. There are many debatable points in the period of the history of the Indian peninsula covered by this little volume. Prof. Rapson has presented each side of these controversial matters and has dealt fairly with both sides, even where he advocates the decision which he prefers. His utmost skill is made manifest in the peculiarly uncertain period, vital to the establishment of Indian chronology, where the events of the peninsula approach coordination with the well-established chronology of the Mediterranean civilization. This period is established by the eastern expansion of the empire of Alexander the Great and the obscure crumbling of kingdoms under his successors, until they become indistinct in their absorption by the native races. The end of the period properly denominated ancient India is set at the establishment of the Kushana empire, probably contemporaneous with the initial date of the Çaka era or 78 A.D.

Mountain Panoramas from the Pamirs and Kwen Lun. Photographed and annotated by M. Aurel Stein. 34 pp. Map. Royal Geogr. Soc., London, 1908. 13 x 8½.

During his survey of the Pamirs and the range of the Kwen Lun, Dr. Stein prepared a large number of panoramas with the photo-theodolite, a method especially adapted to the representation upon the map of these excessively lofty and inaccessible mountains. The Council of the Royal Geographical Society has here undertaken the expensive task of reproducing these somewhat remarkable panoramas, Mr. H. W. Simpson, of the Society's office, having taken in charge the technical side and managed it with great success. The concise annotations necessary to the elucidation of the panoramas have been prepared by Dr. Stein himself. In these views, one looks out from high vantage points over plateaus ranging in general level from 10,000 to 15,000 feet and upon peaks which push up nearly 10,000 feet higher. To geographers, and especially phy-

siographers, the views are of interest in revealing the peculiar surface of the vast loess deposits which are everywhere found about the rim of the plateau, and which are opened up by numerous narrow canyons. Panorama VII B, taken from the west foot of Wakhjir Pass and looking to the south and southwest, presents a very valuable view over the glaciers and their moraines.

WILLIAM HERBERT HOBBS.

Über Sibirien nach Ostasien. St. Petersburg und Moskau, Tscheljabinsk, Mandschuria, Wladiwostok und Dairen. Von Otto Goebel. Series: Hendschels Luginsland. 169 pp. Map, ills., index. M. Hendschel, Frankfurt a.M., 1914. Mk. 5. 8 x 5.

This pocket volume is not so much a guide book as it is an itinerary written in a free style which will hold the interest of the distant reader and equally serve the needs of the tourist along the line of the great Siberian railroad. It is profusely illustrated with excellent halftones of scenes which are almost entirely new, many of the views having been photographed by the author. The map of Eurasia, on a scale in which each millimeter corresponds to thirty kilometers, must include everything from Ireland to Alaska; it has been surprisingly well edited in the matter of the inclusion of necessary detail, and in the margin is presented unobstrusively a series of valuable annotations.

Vom Ural bis Sachalin. Von Otto Goebel. 166 pp. D. Reimer (E. Vohsen), Berlin, 1913. Mk. 3.60. 9½ x 6½.

The value of this interesting work lies in its expression of the attitude of an economic investigator toward one of the greatest markets for German wares. Among the public documents of Germany is included his minute reports upon the commerce and industry of Russia's Asiatic empire. This briefer work records the personal impressions which he received on his two journeys from Moscow to the Pacific. The record is very frank, there is no trace of reserve, he observes pertinaciously and he is brutally free in his account of what he has seen. Siberia has been thoroughly exploited by German commerce for many years and all competition of other trading nations has been stifled. The author remarks (1913) upon the fact that in agricultural implements the American makers have had a monopoly which Germany has essayed to break but always in vain.

WILLIAM CHURCHILL.

Palestine in Geography and in History. By A. W. Cooke. Vol. 1: 196 pp. Vol. 2: 254 pp. Maps, index. C. H. Kelly, London, 1901. 2s. 7 x 5.

A popular handbook intended to put within the reach of the ordinary Christian believer the latest results of Palestinian research, with a view to forming a clear mental picture of events recorded in the Bible. There are excellent colored maps, physical, geological, and political. Palestine, as a whole, is summarily surveyed in its geography and history. Then follow particular descriptions of Galilee, Samaria, Judea and eastern and western Palestine. The Hindu, the Buddhist, the Mohammedan, with their own Holy Lands, will hardly agree with the statement that Palestine "has become the most sacred tract in the world." The writer decides against the traditional site of Calvary, and places it on the "dome-shaped mound on the north side of the city, outside the Damascus Gate, in the Moslem Cemetery," known as Gordon's Calvary.

DAVID H. BUEL.

The Tsuredzure Gusa of Yoshida No Kaneyoshi. Being the meditations of a recluse in the 14th Century. Translated with notes by G. B. Sansom. With an appendix by M. Anezaki on religious conditions in Japan in the XIV Century. 146 pp. Ills. *Trans. Asiatic Soc. of Japan*, Vol. 39, 1911. Tokio. 9 x 6.

The ascetic reflections of a fourteenth century Japanese Buddhist hermit, they seem to form a sort of Buddhist "*Mutation.*" There is the same kind of

dogmatic assertion of ascetic axioms so familiar to the readers of Thomas à Kempis. The following are samples:

"There is none but the complete hermit, who leads a desirable life."

"Happy is the man who, mindful of the after life, is diligent in the way of Buddha."

"Shut up in seclusion in a mountain temple, devoting one's self to the service of Buddha, one is never lonely, and feels one's heart cleansed of its impurity."

"It is well for a man to be frugal, to abstain from luxury, to possess no treasures, nor to covet this world's goods."

"If you think your salvation is assured, it is assured."

The book not only affords an unusual insight into the Oriental mind, but also shows how asceticism in all creeds tends to run in the same grooves.

DAVID H. BUEL.

De Bare'e-Sprekende Toradja's van Midden-Celebes. Door N. Adriani en A. C. Kruijt. 1. Deel: 426 pp. 2. Deel: 468 pp. Index. Maps, ills. in separate case. Landsdrukkerij, Batavia, 1912. 11 x 7½.

The authors present a very intimate study of the Toradja, a name which signifies Highlanders. The people are clearly to be associated with the Alfuro and other remnants of a pre-Malayan and probably pre-Polynesian population. The authors deal, in part, with regions traversed by the cousins Sarasin in their brilliant reconnaissance of Celebes. In establishing the abode of the Toradja they have worked with reference to drainage basins, these being the Posso, the Laa and the Kalaena, to which they add the coastal region of Todjo. This work is designed to make plain the conditions which are found to underlie the social subdivisions of the Toradja. It is an excellent piece of ethnography and will be found to abound in material carefully observed and excellently elaborated. In connection with the work of Friederici in the New Guinea region and of others in Polynesia, a warm welcome awaits every piece of such research upon the hidden races which may be found to preserve traces of life in Indonesia anterior to the Malay culture which overwhelmed the earlier cultures in the accessible littoral regions. WILLIAM CHURCHILL.

EUROPE

The Archæology of the Anglo-Saxon Settlements. By E. Thurlow Leeds. 144 pp. Ills., index. Clarendon Press. Oxford, 1913. 5s. 9 x 6.

This is the first clear statement of the sites which yield record of the invasion of Britain by Germanic people and of their settlement in their new home. Mr. Leeds has made a careful study of the artifacts of the period before the coming of Christianity and shows himself both broad and brilliant in interpretation. He establishes beyond reasonable doubt that the newcomers avoided the great Roman roads as a source of danger and established their colonies along the waterways. He has been very successful in establishing the centers of settlement by Angles, Jutes and Saxons, but less successful in identifying the continental sources of origin of these three early stems out of which has grown the English race.

The Governments of Europe. By Frederic Austin Ogg. xiv and 668 pp. Index. The Macmillan Co., New York, 1913. $3. 9 x 6.

This will be found a convenient and trustworthy manual for purposes of reference, and probably it may be used to advantage in college courses in modern history. The title is more general than are the contents of the volume, for Prof. Ogg, assigning lack of space as the reason, omits all mention of the civic condition of the peoples of eastern Europe and thus expunges all the difficult problems from Athens to St. Petersburg by way of the Balkans and the remnant of the Sultan's empire. For the region which space has permitted him to cover we have a summary history of the growth of government sufficient to explain the present civic conditions, and this is followed by a clear exposition

of the constitution of government and its relation to the governed in Great Britain, the German Empire, France, Italy, Switzerland, Austria-Hungary, Belgium and the Netherlands, Scandinavia, Spain and Portugal. The last-named state affords a measure of the extent to which the volume has dealt with modern conditions, for it analyzes the Portuguese constitution of 1911, under which the republic is now operative.

Travels in the Pyrenees, including Andorra and the Coast from Barcelona to Carcassonne. By V. C. Scott O'Connor. xx and 348 pp. Map, ills., index. Dodd, Mead & Co., New York, 1913(?). $3. 9 x 6.

It is only with the eastern section of the Pyrenees, the home of the Catalan people, that this book is especially concerned. Throughout these regions, rich in scenery and history of the past, the author traveled, and as he traveled he wrote this book, "now in a hayfield upon a summer afternoon in Andorra, now under the awnings of some old Catalan inn, now to the sound of running waters in the quiet shelter of Vernet Park." And by writing on the very spot which he described, Mr. O'Connor has secured the atmosphere, the local color, better than he otherwise could have done. But it is not alone with personal experiences that the author deals; he also takes up, and that rather fully, the history, associations, and character of the people among whom he lived. Numerous photographs, several colored illustrations, and a sketch map of the Eastern Pyrenees are included. WILBUR GREELEY BURROUGHS.

Die Südrumänen der Türkei und der angrenzenden Länder. Beitrag zur Ethnographie der Balkanhalbinsel. Von Victor Lazăr. 344 pp. Map. G. Ionescu, Bukarest, 1910. 7½ x 5.

This unpretentious volume gives an admirable account of the essentials of the history of the Wallachs and a sympathetic treatment of their present life. The author is an official of the library staff of the Royal Academy of Rumania. His best work in this book deals with the life and thought of the common people. From his observations upon their habits we may gain an excellent impression of the sturdy qualities of these independent souls, whose proud boast is yet that they are Romans. In one chapter is a careful selection from the tradition literature of the Wallachs—ballads, folklore and fireside riddles. This material goes far to explain the intense national pride which has kept this folk apart from encroaching neighbors ever since the eastern empire went down before the barbarian and the Osmanli Turk.

Austria: Her People and Their Home Lands. By James Baker. xiv and 310 pp. Map, ills., index. John Lane Co., New York, $6.50. 9 x 6.

The author endeavors to draw the attention to what might be overlooked in Austria, rather than to emphasize the obvious. Therefore, in addition to descriptions of the various regions, he tells of the family life of peasant and well-to-do citizen, of the intellectual aspirations and amusements of the people, and gives brief accounts of the history of the several provinces, showing how the empire has been built up. He knows his topic. Donald Maxwell's illustrations in color are a feature. The book should appeal to travelers.
WILBUR GREELEY BURROUGHS.

Héroïsme et Patriotisme des Belges. L'œuvre civilisatrice au Congo. Par Commandant Adt. d'État Majr. Renier. viii and 364 pp. Ad. Hereckenrath, Gand, 1913. Fr. 7.50. 11½ x 9.

Two themes interlace in this volume. One is to record the courage and devotion of these descendants of the Fleming and the Walloon, who fought for centuries their battles against Europe and, in more recent years, have been fighting the battles of civilization against the primeval savagery of Africa. The other theme is developed in a precise and entertaining summary of the sweep of exploration across equatorial Africa. The Congo Free State, now the Belgian Colony of the Congo, has been the target of much attack. At last the Belgians have begun to write their history of the Congo, and we are having

the other side of the story. It is a record of bravery in conquering obstacles of nature and of man, of fighting to advance the frontier of civilized life. Chapter by chapter the author unfolds the simple tales of great adventure, and through every chapter runs the proof that in their relations to the African savages the Belgians have been inspired by a sympathy with the inferior race and a wise toleration of the childhood of mankind. WILLIAM CHURCHILL.

La Bulgarie d'hier et de demain. Par L. de Launay, 3d edit. 494 pp. Ills. Hachette & Cie., Paris, 1912. Fr. 5.50. 7½ x 5.

A popular, geographical, historical and political work on Bulgaria. Its object is to make known to the French reading public the leanings toward France of the Czar and his Ministers. It begins with a concise history of the country from Roman times and then gives an account of the physical geography of the land, and the manners, customs, and dress of the people. A few words are given to the Jewish question in Bulgaria and a more extended account follows of the religious situation in the country, according to which the Latins strove to have the nation embrace the Roman faith in a body, the Greeks resented the desire of the people to have a patriarch independent of Constantinople, and the nation itself wished to have a national church of its own. The usual account is given of the siege of Plevna and of the baptism of the Catholic-born Prince Boris in the orthodox faith. DAVID H. BUEL.

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

NORTH AMERICA

AMERICAN POLICY. The western hemisphere in its relation to the eastern. By J. Bigelow. 184 pp. Map, index. C. Scribner's Sons, New York, 1914. $1. 8 x 5½.

SEMI-CENTENNIAL HISTORY OF WEST VIRGINIA. By James J. M. Callahan. 593 pp. Maps, ills. Semi-Centennial Commission, Charleston, W. Va. 1913. $1. 9½ x 6½.

STUDIES IN INDIANA GEOGRAPHY. Edited by C. R. Dryer. 113 pp. Maps, index. Inland Publishing Co., Terre Haute, Ind., 1897. 11 x 8.

WASHINGTON. THE NATION'S CAPITAL. By C. B. Reynolds. 164 pp. Map, ills., index. Foster & Reynolds Co., New York, 1911. 25 cents. 8 x 5½.

SOUTH AMERICA

AS AVES NOS COSTUMES, SUPERSTIÇÕES E LENDAS BRAZILEIRAS E AMERICANAS. Pelo P. E. Teschauer. 2nd edit. 74 pp. Pinto & Cie., Rio Grande, 1913. 8½ x 6.

AFRICA

THE CEMETERIES OF ABYDOS. Part 2: 1911-12. By T. E. Peet. 133 pp. Ills. Egyptian Exploration Fund. London, 1914. $5. 12½ x 10.

PROVINCE OF THE CAPE OF GOOD HOPE. Marine Biological Report. No. 1, for 1912 and for half year ending June 30, 1913. 70 pp. Ills., index. Govt. Printers, Cape Town, 1913. 10 x 6.

ATLANTIC ISLANDS

THREE YEARS IN TRISTAN DA CUNHA. By K. M. Barrow. xii and 280 pp. Map, ills. Skeffington & Son, London, 1910. 7s. 6d. 8½ x 5½.

XUM

ASIA

ANNUAL REPORT of the Meteorological Observatory of the Government General of Korea for 1912. 26 and 120 pp. Chemulpo, 1913. 12 x 9.

THE KACHÁRIS. By the late Rev. Sidney Endle. 128 pp. Map, ills., index. Macmillan & Co., London, 1911. $2.50. 9 x 5½.

A JOURNEY THROUGH AZERBAIJAN AND PERSIAN KURDISTAN. 27 pp. Map, ills. The Persia Society, London, 1913. 1s. 6d. 9 x 5½.

A FLORA OF MANILA. By E. D. Merrill. 490 pp. Index. Bur. of Science, Manila, 1912. 9½ x 6½.

EUROPE

DAS ALBANISCHE PROBLEM. Politisches und wirtschaftliches. Von H. Grothe. 30 pp. Gebauer-Schwetschke, Halle, 1914. 60 pfg. 9½ x 6½.

HEREFORDSHIRE. By A. G. Bradley. 149 pp.; Northumberland. By S. R. Haselhurst. 181 pp. (Cambridge County Geographies.) Maps, ills. Univ. Press, Cambridge. G. P. Putnam's Sons, New York, 1913. 1s. 6d. each. 7½ x 5.

MEERESKUNDLICHE UNTERSUCHUNGEN in der deutschen Bucht. Von F. Wendicke. Inaug.-Dissert., Univ. Berlin. 70 pp. Diagrams. Berlin, 1913(?). 9 x 6.

ÜBER MEGALITHGRÄBER und sonstige Grabformen der Lüneburger Gegend. Von M. M. Lienau. 42 pp. Map, ills. C. Kabitzsch, Würzburg, 1914. Mk. 4. 10½ x 7.

THE STORY OF LUCCA. By Janet Ross and Nelly Erichsen. xiii and 365 pp. Map, ills., index. E. P. Dutton & Co., New York, 1912. $1.75. 7 x 4½.

PORTO PÍ in der Bucht von Palma de Mallorca. xxxii and 709 pp. Map. Heinr. Mercy Sohn, Prag, 1914. 9 x 6½.

THE STORY OF SANTIAGO DE COMPOSTELA. By C. G. Hartley (Mrs. W. M. Gallichan). xii and 332 pp. Map, ills., index. E. P. Dutton & Co., New York, 1912. $1.75. 7 x 4½.

NACH ZERMATT. GORNERGRAT. SAAS-FEE. Von H. Behrmann. (Hendschels Luginsland.) 70 pp. Map, ills., index. M. Hendschel, Frankfurt a.M., 1914. Mk. 1.75. 8 x 5½.

POLAR

SOME ETHICAL PHASES OF ESKIMO CULTURE. By A. N. Gilbertson. Dissertation . . . Clark Univ., Worcester, Mass. 86 pp. Reprint, *Journ. Religious Psychology*, Vol. 6, 1913, No. 4, Vol. 7, 1914, No. 1. 9 x 6.

PHYSICAL GEOGRAPHY

LEHRBUCH DER GRUNDWASSER- UND QUELLENKUNDE. Für Geologen, Hydrologen, etc. Von K. Keilhack. xi and 545 pp. Map, ills., index. Gebrüder Borntraeger, Berlin, 1912. 10 x 7.

RIVERS AND ESTUARIES, OR STREAMS AND TIDES. An elementary study. By W. H. Hunter. 69 pp. Diagrams, index. Longmans, Green & Co., 1913. 2s. 6d. 9½ x 5½.

VORSCHULE DER GEOLOGIE. Eine gemeinverständliche Einführung und Anleitung zu Beobachtungen in der Heimat. Von J. Walther. 5th edit. 237 pp. Ills., index. G. Fischer, Jena, 1912. 7½ x 5.

MATHEMATICAL GEOGRAPHY AND CARTOGRAPHY

HIMMELSKUNDE. Versuch einer methodischen Einführung in die Hauptlehren der Astronomie. Von J. Plassmann. 3d edit. xv and 572 pp. Ills., index. Herdersche Verlagshandlung, Freiburg, 1913. Mk. 11. 9½ x 6½.

LANDMETEN EN WATERPASSEN. Bewerkt door F. J. H. M. Thys. 527 pp. Ills. in separate volume. Kon. Militaire Acad., Breda, 1912. 9½ x 6.

ECONOMIC AND COMMERCIAL GEOGRAPHY

COMMON COMMODITIES OF COMMERCE: Coal. By F. H. Wilson. 129 pp.; Coffee from Grower to Consumer. By B. B. Keable. 122 pp.; Cotton. By R. J. Peake. 126 pp.; Iron and Steel. By C. Hood. 150 pp.; Rubber. By H. P. Stevens and C. Beadle. 132 pp.; Silk. By L. Hooper. 126 pp.; Sugar, Cane and Beet. By G. Martineau. 153 pp.; Tea. By A. Ibbetson. 116 pp.; Tobacco. By A. E. Tanner. 118 pp.; Wool. By J. A. Hunter. 118 pp.; Maps, ills., index in each. I. Pitman & Sons, London (no date). 1s. 6d. each. 7½ x 5.

COAL MINING. By T. C. Cantrill. (Cambridge Manuals.) 159 pp. Ills., index. G. P. Putnam's Sons, New York, 1914. 40 cents. 6½ x 5.

DIE ERDE UND DIE KULTUR. Die Eroberung und Nutzbarmachung der Erde durch den Menschen. Dargestellt von L. Reinhardt. Vol. 1: Die Erde und ihr Wirtschaftsleben. R. Hotz. 405 pp. Vol. 2: Kulturgeschichte des Menschen. L. Reinhardt. 709 pp. Vol. 3: Kulturgeschichte der Nutztiere. L. Reinhardt. 760 pp. Vol. 4, Parts 1 and 2: Kulturgeschichte der Nutzpflanzen. L. Reinhardt. 738 and 756 pp. E. Reinhardt, Munich, 1911. 9 x 6½.

LEHRE VON DEN ERZLAGERSTÄTTEN. By R. Beck. 3d revised edit. Vol. 1: 540 pp. Vol. 2: 542 pp. Maps, ills., index. Gebrüder Borntraeger, Berlin, 1909. 10 x 7.

DIE WICHTIGSTEN LAGERSTÄTTEN DER "NICHT-ERZE." Von O. Stutzer. 1. Teil: Graphit, Diamant, Schwefel, Phosphat. 474 pp. 2. Teil: Kohle (Allgemeine Kohlengeologie). 342 pp. Maps, ills., index. Gebrüder Borntraeger, Berlin, 1914. Mk. 32. 10 x 7½.

DIE URHEIMAT DER LANDWIRTSCHAFT ALLER INDOGERMANISCHEN VÖLKER an der Geschichte der Kulturpflanzen und Ackerbaugeräte in Mittel- und Nordamerika nachgewiesen. By R. Braungart. viii and 470 pp. Ills. C. Winter, Heidelberg, 1912. 12 x 9½.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

System Followed in Listing Maps
(except under "Other Maps Received")

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original). If no scale on original, approximate scale enclosed in brackets.

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Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, year, number, and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Sievers's *Länderkunde*, Kleine Ausgabe.

ASIA

China. Reiseweg des Deutschen Konsuls Weiss durch den Süden von Ssuchuan (Cheng-tu—Chien-chang). 1:2,500,000. 30°20′ - 25°0′ N.; 100°10′ - 104°50′ E. 3 colors. Accompanies, as Pl. 39, "Wirtschaftliche Verhältnisse des Chienchangtals in Szetschuan" by — Weiss, *Petermanns Mitt.*, Vol. 60, I, 1914, June, pp. 310-315.

[The journey led from Chengtu (30⅔° N. and 104° E.) south-southwest via the valley of the upper Anning-ho (also termed the Chieng-chang Valley) to the Yangtzekiang at the mouth of the Yalung (26⅔° N. and 101¾° E.), with variants at both ends. Although the text (p. 311) refers in general terms to the excellent surveys of French and English explorers, the map does not embody them, for instance in the representation of the Yalung River, for which the surveys of the Mission Legendre (see under "China," *Bull.*, Vol. 45, 1913, p. 318) and of Capt. Audemard (under "China," *Bull.*, Vol. 46, 1914, pp. 795-797) are available.]

Dutch East Indies. Übersichtskarte von Seran. Bearbeitet von K. Deninger und O. D. Tauern. 1:500,000. 2°44′ - 3°50′ S.; 127°48′ - 130°53′ E. 3 colors. Accompanies "Morphologische Übersicht der Insel Seran" by K. Deninger, *Petermanns Mitt.*, Vol. 60, II, 1914, July, pp. 16-18.

[Locational element predominates: only isolated representation of relief.]

Turkey in Asia, etc. Distribution of mineral products and railways of Asia-Minor (by) Leon Dominian. 1:6,000,000. 44° - 29⅓° N.; 23° - 51° E. 11 colors. Map No. 8, with accompanying text (4 pp.), of *Doc. Cartogr. de Géogr. Écon.* (Bern), 1913, No. 2.

[Helpful map giving a general survey, hitherto unavailable, of the mineral resources of Asiatic Turkey. The place of occurrence of 25 kinds of minerals (under coal, separate symbols for lignitic, bituminous and anthracite) is shown in red by means of the usual chemical abbreviations. The site of refining plants is indicated, distinction being made between those employing modern foreign methods and crude native methods. Railroads in operation, under construction and proposed are differentiated in black, while a colored overprint indicates the nation by which they are controlled. This broadly outlines the French, British and German "spheres of influence." The use of a broken red line to indicate Turkish railroads might create the impression, at first glance, that they were not completed, although this includes the Hejaz railway; the color plates used would have made possible a continuous purple line, for instance. An excellent physical map forms the basis; relief is shown in well-generalized brown hachuring, supplemented by four hypsometric tints of green and brown. Drainage is in blue. That political boundaries are also shown in this color seems unfortunate, as the *wadis* and international boundaries thus become identical.]

XUM

AUSTRALASIA AND OCEANIA

German New Guinea. Die Südostküste von Manus und die Insel Pack, von Marine-Stabsarzt Dr. Börnstein. 1:100,000. 2°5′ - 2°15′ S.; 147°2′ - 147°19′ E. 1 color. With two insets: (1) (Insel Pack). 1:100,000. 2°5′ S. and 147°37′ E. 1 color. (2) (Kelaua-Hafen). 1:40,000 approx. 2°7′ S. and 147°17′ E. 1 color. Accompanies, as part of Pl. 41, "Forschungen auf den Admiralitätsinseln" by — Börnstein, *Petermanns Mitt.*, Vol. 60, I, 1914, June, pp. 315-317.

[Detailed representations of localities shown on the map listed under "German New Guinea" in the *Bull.*, Vol. 46, 1914, p. 317, which is reprinted as part of the present plate. The outlines vary considerably from those on that general map, especially in the case of Pack Island.]

EUROPE

France, etc. La France viticole (par) Élie Bertrand. 1:3,000,000. 51½° - 42° N.; 3° W. - 8° E. 8 colors. With two insets: (1) [Corsica]. Same scale. 42° N. and 9° E. 2 colors. (2) Principaux Vignobles [of France]. [1:12,000,000]. Same limits as main map. 4 colors. Map No. 3, with accompanying text (5 pp.), of *Doc. Cartogr. de Géogr. Écon.* (Bern), 1913, No. 1.

[Shows, by *départements*, the percentage of area in which the vine is cultivated, six degrees of intensity being distinguished. Inset (2)—which is more geographical than the main map in that on it distribution is not shown, as there, by administrative divisions—indicates the vine-growing and cider-producing areas.]

Germany. Entwickelungsgeschichtlich-physiognomische Planskizze von Strassburg i.E. Gezeichnet von G. Braun, 1914. 1:15,000. 48°35′ N. and 7°46′ E. 9 colors. Accompanies article with same title by same author, *Petermanns Mitt.*, Vol. 60, II, 1914, July, pp. 7-8.

[Suggestive map showing the growth of the city. The map differentiates between (1) the old nucleus (four subdivisions: the Roman fort and the enlargements respectively made about 950, 1250 and 1400); (2) the newer parts of the town (bombarded area of 1870 and territory built up since that date); (3) military areas; (4) areas occupied by administrative buildings and the university; (5) areas devoted to commerce and manufacturing. Within the city, contours with a vertical interval of one meter are shown.]

Germany, etc. Die Wollindustrie Deutschlands (von) Ernst Friedrich. 1:3,000,000. 56° - 47° N.; 5° - 23° E. 5 colors. Map No. 2, with accompanying text (4 pp.), of *Doc. Cartogr. de Géogr. Écon.* (Bern), 1913, No. 1.

[Shows the areas in which the wool industry flourishes, distinguishing three grades of intensity and five classes of towns according to the number of factories they contain.]

Norway-Sweden, etc. Carte économique de la Norvège (par) Camille Vallaux. 1:4,500,000. 7½° - 55⅔° N.; 2° - 32° E. 3 colors. Map No. 1, with accompanying text (3 pp.), of *Doc. Cartogr. de Géogr. Écon.* (Bern), 1913, No. 1.

[Shows principal fishing areas and ports off the coast of Norway, with names of species of fish caught; extent of coniferous forest; location of saw mills, wood-pulp factories, hydro-electric plants, silver, copper and iron mines; and principal railroads and steamship routes.]

Switzerland, etc. Chemins de fer et mouvement de la Population dans le Canton de Vaud (par) Charles Biermann. 1:300,000. 47°0′ - 46°11′ N.; 5°55′ - 7°23′ E. 5 colors. Map No. 9, with accompanying text (3 pp.), of *Doc. Cartogr. de Géogr. Écon.* (Bern), 1913, No. 2.

[Suggestive map showing the connection between railroad development and the fluctuation of the population in the Swiss canton of Vaud. Both the carrying and the distributing capacity of the railroads is expressed in the symbolism. Four types of lines are distinguished: (1) standard gauge, double track; (2) standard gauge, single track; (3) narrow gauge; (4) suburban and cog-

wheel. On the standard-gauge lines seven types of stations, and on the suburban lines, two, are distinguished according to the number of trains stopping there, express and local trains being differentiated. Seven degrees of increase and two of decrease are shown respectively for the areas of population growth and diminution.]

Other Maps Received

NORTH AMERICA

United States

Connecticut. Map of the railroads of Connecticut, to accompany the report of the Railroad Commissioners. 6 mi. to 1 in. [Railroad Commissioners, Hartford, 1913.]

Kentucky. Railroad map of Kentucky. 7.2 mi. to 1 in. The R.R. Commissioners, Frankfort, 1913-14.

Map of the western border of the eastern coalfield, compiled and drawn by J. B. Hoeing, C.E. 1:125,000. 3 sheets. Kentucky Geological Survey, Frankfort, 1907-08.

[Four sheets showing geology of Green River region, Ky.] [1:62,500.] [Geological Survey of Kentucky, Frankfort, 1914.]

Revised preliminary map of south-east Kentucky, compiled from actual surveys and field notes of members of the survey, by J. B. Hoeing, C.E. 5 mi. to 1 in. Kentucky Geological Survey [Frankfort], 1907.

Preliminary map of the Pineville and Middlesboro regions, by J. B. Hoeing, C.E. 1 in. to 1 mi. Kentucky Geological Survey, Frankfort, 1907.

Map of the Licking Valley Region, by J. B. Hoeing, C.E. 1 in. to 1 mi. Kentucky Geological Survey, Frankfort, 1907.

Map of the upper Cumberland Valley and contiguous regions, compiled from surveys and maps of the Kentucky & U. S. Geological Surveys, by J. B. Hoeing, C.E. 1 in. to 1½ mi. Kentucky Geological Survey, Frankfort, 1907.

Louisiana. Map of the State of Louisiana, issued for the Railroad Commission of Louisiana as a supplement to its 15th annual report. 8 mi. to 1 in. Railroad Commission of Louisiana [Baton Rouge], 1914.

Maine. Railroad map of Maine, prepared under the direction of, and presented by, the Railroad Commissioners of Maine. 8 mi. to 1 in. Railroad Commissioners [Augusta], 1914.

Massachusetts. Map of the street railways of the commonwealth of Massachusetts, accompanying the report of the Public Service Commission. 4 mi. to 1 in. [Public Service Commission, Boston], 1914.

Nebraska. Official railway map of Nebraska. State Railway Commission. 10 mi. to 1 in. Lincoln, Neb., 1911.

New Jersey. The Rand-McNally new commercial atlas map of New Jersey. 7 mi. to 1 in. Rand, McNally & Co., Chicago, 1912.

New York. Map of the Adirondack Mountains, showing how to reach them by the New York Central Lines. 5½ mi. to 1 in. [New York Central R.R., New York, 1914.]

Auto-road map of the Adirondacks, compiled by S. R. Stoddard. 4 mi. to 1 in. S. R. Stoddard, Glens Falls, N. Y., 1913. 25 cents.

[Geological survey of the State of New York]. 1:62,500. Quadrangles: Grindstone, 1908; Theresa, 1907; Cape Vincent, 1908; Clayton, 1908; Alexandria Bay, 1908. University of the State of New York [Albany].

Canal map of the state of New York, issued by the State Engineer & Surveyor. 25 mi. to 1 in. State Engineer & Surveyor [Albany], 1912.

Map of New York State showing area and population within various distances from the barge canal. 40 mi. to 1 in. [State Engineer & Surveyor, Albany, 1913].

Bird's-eye view of the Barge Canal [New York]. [State Engineer & Surveyor, Albany, 1913.]

XUM

Rhode Island. Map showing railroads and railways of the State of Rhode Island. 1¾ mi. to 1 in. Issued by the Public Utilities Commission of Rhode Island [Providence], 1909.

United States. Bacon's Excelsior Map of the United States. 1:3,200,000. Inset: Philippine Islands, 1:7,500,000. G. W. Bacon & Co., London [1914].

Wisconsin. Official railroad map of Wisconsin. 1 in. to 10 mi. Railroad Commission of Wisconsin [Madison], 1912.

Wisconsin–Michigan. Detailed map of the Lake region of northern Wisconsin and Michigan. 4 mi. to 1 in. Chicago & North-Western Ry. Co., Chicago, 1914.

West Virginia. Map of West Virginia, showing coal, oil, gas, iron ore and limestone areas. 8 mi. to 1 in. West Virginia Geological Survey, Morgantown, W. Va., 1914.

SOUTH AMERICA

Brazil. Mappa da viação ferrea de São Paulo e partes dos estados vizinhos, pelo Engenheiro R. Heyse. 1:1,000,000. Insets: Planta da cidade de Rio de Janeiro, 1:100,000; Planta da cidade de S. Paulo, com os seus arrabaldes, 1:100,000; Porto de Santos, 1:100,000. Weiszflog Irmãos, S. Paulo, 1912.

Mappa do Sul do Brazil, organisado por Gentil de Assis Moura. 1:2,500,000. Inset: Viação ferrea dos Estados de Rio de Janeiro, Minas Geraes et S. Paulo. 1:2,500,000. Weiszflog Irmãos, S. Paulo [1912].

AFRICA

Egypt. Egypt 1:250,000. Sheets: 1E, Northwest Delta; 1F, Northeast Delta; 2E, Southwest Delta; 2F, Southeast Delta; 3E, Fayum; 3F, El Saf. Survey Department [Giza], 1910-1913.

Libya. Tripolitania, territorio fra la costa e l'uadi Sciati. 1:1,500,000. Inset: Tripoli, 1:50,000. Ministero delle Colonie [Rome], [1914].

Itinerario percorso dalla Colonna Miani, riduzione dello schizzo a firma del T. C. Miani pubblicato dal Governo della Tripolitania. 1:1,500,000. Ministero delle Colonie [Rome], 1914.

Rilievi in Libia, grafico della triangolazione in Cirenaica. 1:200,000. Ministero delle Colonie [Rome], 1914.

[Benghazi region]. 1:50,000. [Ministero delle Colonie, Roma, 1913.]

Tripoli. 1:15,000. Ministero delle Colonie [Rome], 1914.

Pianta di Tripoli. 1:5,000. Ministero delle Colonie [Rome], 1914.

Natal. Map of Natal showing the magisterial divisions. 30 mi. to 1 in. [From the City Engineer, Durban, 1914.]

Map of Natal, showing electoral divisions and wards for the Natal provincial council. 30 mi. to 1 in. [From the City Engineer, Durban, 1914.]

Map of Natal, showing the Union Parliamentary Electoral Divisions and wards. 30 mi. to 1 in. [From the City Engineer, Durban, 1914.]

Map of Natal, showing the countries and territories and native reserves. 30 mi. to 1 in. [From the City Engineer, Durban.]

Road and railway map of the province of Natal. 1:1,267,200. Insets: [Pietermaritzburg and environs]; Durban and environs, 4 mi. to 1 in. [Gift from the Borough Engineer, Durban.]

ASIA

Ceylon. Agricultural map of northern province, Ceylon. 1:253,440. Survey Dept., Colombo [1913].

Agricultural map of the eastern province, Ceylon. 1:253,440. Survey Dept., Colombo [1913].

Agricultural map of the Province of Uva, Ceylon. 1:253,440. Survey Dept., Colombo, 1913.

Siam. Map of the Muangs Patalung & Sawngkla, Province of Nakawn Sritamarat. 1:320,000. Royal Survey Dept., Bangkok, 1907.

Map of Muang Sritamarat. 1 in. to 200 sen. Royal Survey Dept., Bangkok [1913].

Tibet. Map of portion of Western Tibet, explored by Captain C. G. Rawling and Lieut. A. J. G. Hargreaves of the Somerset Light Infantry. 1:760,320. Survey of India, Calcutta, 1904.

AUSTRALASIA AND OCEANIA

Australia. Large scale map of Australia, specially drawn for school and office use. 1:2,500,000. G. W. Bacon & Co., London [1914].

Map of Western Australia. 30 mi. to 1 in. Dept. of Lands & Surveys, Perth, 1913.

Map of Western Australia. 75 mi. to 1 in. Inset: Western Australia, map showing timber areas in southwest portion, 75 mi. to 1 in. Dept. of Lands & Surveys, Perth, 1913.

Map of southwest part of Western Australia, showing agricultural and pastoral lands and the products for which they are best suited. 32 mi. to 1 in. Inset: Map of Western Australia (whole state), 125 mi. to 1 in. Dept. of Lands & Survey, Perth [1913].

EUROPE

British Isles. Railway map of the British Isles, by John Bartholomew. 19 mi. to 1 in. Insets: Swansea and Cardiff district, 10 mi. to 1 in.; Enlargement of South Lancashire and Yorkshire district, 9 mi. to 1 in. John Bartholomew, Edinburgh [1913].

Bacon's map of the Isle of Wight. 1 in. to 1 mi. G. W. Bacon & Co., London [1914]. Price 1s.

Central Europe. Map of Central Europe. 33⅓ mi. to 1 in. War College Division, General Staff, Washington, Aug. 1914.

Map showing Franco-German frontier. 13 mi. to 1 in. War College Division, General Staff, Washington, Aug. 1914.

Nordost-Frankreich, Belgien und Luxemburg, Deutsche Rheinländer. Entworfen und gezeichnet von G. Freytag. II. Auflage bearbeitet von Dr. K. Peucker. 1:800,000. Artaria & Co., Wien, 1914. Price M. 2.

Europe. Walker's European War Map. Walker Lith. & Pub. Co., Boston, 1914.

The European conflict. Map showing location of modern fortified positions and naval bases. 200 miles to 1 in. C. P. Gray, New York, 1914.

Military map of Europe, compiled from the most authentic sources. 100 mi. to 1 in. General Drafting Co., New York, 1914.

General map showing European frontiers, 1914. 86 mi. to 1 in. John Bartholomew & Co., Edinburgh, 1914.

General map showing European frontiers. 1:2,000,000. John Bartholomew & Co., Edinburgh, 1914.

The National Geographic Magazine map of the new Balkan states and central Europe, prepared by J. G. Bartholomew. 86 mi. to 1 in. National Geographic Society, Washington, D. C., 1914.

[War map of Europe]. Supplement to the war number of the Scientific American, September 5, 1914. [Scale approximately 260 mi. to 1 in.]. The Scientific American, New York, 1914.

France. Massif de Gavarnie et du Mont Perdu. Levé, dressé et dessiné par F. Schrader. 1:20,000. Henry Barrère, Paris, 1914.

Carte de la forêt de Haye, près Nancy. 1:20,000. [N. E. and N. W. sheets]. Berger-Levrault, Paris [1914].

XUM

Aix-les-Bains, Mont Revard, Dent du Nivolet. Carte éditée par les soins du Club des Sports d'Hiver. 1:20,000. [Club des Sports d'Hiver, Aix-les-Bains], 1914.

Germany. Karte von Berlin und Umgebung in 12 Blättern. 1:50,000. Kgl. Preuss. Landesaufnahme, Berlin, 1913.

Karte der nutzbaren Lagerstätten Deutschlands. 1:200,000. Gruppe: Preussen und benachbarte Bundesstaaten. Leitung: F. Beyschlag. Lieferung IV [1911] and Lieferung V [1912]. Kgl. Preuss. Geol. Landesanstalt, Berlin.

Geologische Karte von Preussen und benachbarten Bundesstaaten. 1:25,000. Lieferung 180: Bl. Langeoog (Ostende), Esens, Middels, Spiekeroog, Karolinensiel, Wittmund. Lief. 151: Bl. Altenwalde mit Insel Neuwerk u. Scharhörn, Cuxhaven, Midlum, Westerwanna. Kgl. Preuss. Geol. Landesanstalt, Berlin, 1912 and 1910, respectively.

The Netherlands. Postkaart van Nederland. 1:250,000. [Postal Dept., The Hague, 1913]

Norway. Kart over Nordre Trondhjems Amt. 1:200,000. Norges geografiske Opmaaling [Christiania], [1913].

Landgeneralkart over Norge i 1:250,000. Blad XXVI, Vega. Norges geografiske Opmaaling [Christiania], 1914.

Topografisk kart over kongeriget Norge. 1:100,000. Sheets: L7, Andöya [1914]; L8, Kvaefjord [1914]; M12, Riddoalgge [1913]; W6, Karasjok [1914]; 31A, Espedalen [1913]. Norges geografiske Opmaaling [Christiania].

Valgkart over Norge, utarbeidet av Johan Ydstie og Arne Blom. Forlagt av Cammermeyers Boghandel, Kristiania, 1913.

Spain. Alava. 1:700,000. Alberto Martin, Editor, Barcelona [1913].

Plano general de San Sebastian. 1:2,000. [Blueprint]. [Gift from the Alcalde Mayor, San Sebastian, 1914].

Provincia de Madrid. Mapa construido con los datos del Instituto Geográfico y Estadistico. 1:200,000. Publicado por Don José Mendez, Madrid [1913]. [Gift from Señor Alcalde Mayor, Madrid.]

Sweden. Karta över Södre Sveriges Landformer av Sten De Geer. 1:500,000. Generalstabens Lit. Anstalt [Stockholm], 1914.

Switzerland. Uebersichtsplan über den Gemeindsbezirk Bern. 1:10,000. Herausgegeben vom Katasterbureau der Stadt Bern, 1914.

ATLASES

Bacon's Excelsior Contour-Relief Atlas. 36 plates of colored maps. G. W. Bacon & Co., Ltd., London, 1912 (?) 1s. 10 x 7½.

República de Chile. Atlas de la monografia de lineas ferreas fiscales en estudio y construcción. Congreso de Ferrocarriles de Buenos Aires en 1910. Anexo à la Monografia de los Ferrocarriles Fiscales de Chile presentada al Congreso de ferrocarriles de Buenos Aires en 1910. 41 plates of colored maps and profiles. Ministerio de Industria i Obras Públicas (Santiago). 15 x 23½.

Wirtschafts-Atlas der Deutschen Kolonien. Herausgegeben von dem Kolonial-Wirtschaftlichen Komitee E. V. 2. verbesserte Auflage. 10 plates of colored maps. Berlin, 1913. 17½ x 13½.

Atlas des Missions de la Société des Missions-Etrangères. Par Adrien Launay. 27 colored maps accompanied by geographical and historical notes. Desclée, De Brouwer et Cie., Lille, 1890. 23 x 15½.

Atlas of Ancient History. By William R. Shepherd. American Historical Series. 43 plates containing colored maps and index of 24 pp. Henry Holt & Co., New York, 1913. 10 x 7.

Philips' New Historical Atlas for Students. A Series of 65 Plates, containing 154 Colored Maps and Diagrams, with an Introduction illustrated by 43 Maps and Plans in black and white. By Ramsay Muir. xiv and 62 pp. Index. George Philip & Son, Ltd., 1911. 9s. 9 x 6.

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